HUNTING WEAPONS

FROM THE MIDDLE AGES TO THE TWENTIETH CENTURY

HOWARD L. BLACKMORE

As a sporting event engaged in by commoner and king alike, the hunt was a mentally and physically invigorating experience, providing all the danger and excitement of battle without the accompanying cost of human life. Until the publication of this book, however, there were few—if any—works devoted exclusively to the weapons of the hunt. That deficiency is remedied here with this detailed, comprehensive account of swords, knives, bayonets, staves, bows, crossbows, guns, and other hunting weapons dating from the Middle Ages to modern times.

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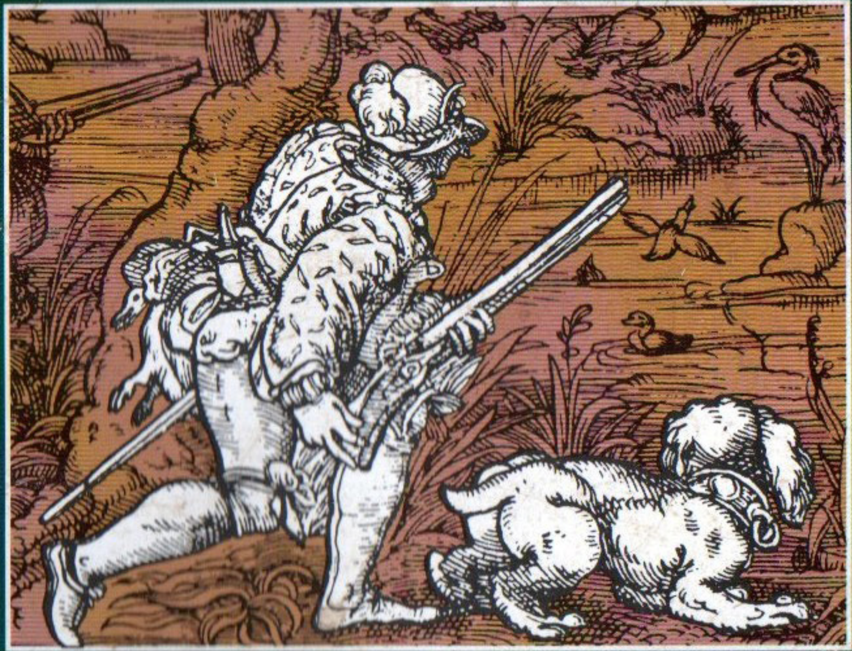
WITH 288 ILLUSTRATIONS



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from the Middle Ages to the Twentieth Century

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Howard L. Blackmore

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To the memory of my father

DUDLEY BLACKMORE

1879–1941

who loved the countryside.

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Preface

In 1890 Baron de Cosson wrote in the Introduction of *Ancient Sporting Weapons at the Grosvenor Gallery* 'there is, perhaps, no part of the whole subject of ancient arms that has been more neglected than the history of those weapons that were used for sport. Indeed in scarcely any collection in Europe has any serious attempt been made to distinguish weapons of war from sporting weapons.' His contemporaries, the pioneer writers on arms and armour, Wendelin Boeheim, Auguste Demmin, and Viscount Dillon, indeed gave scant attention to weapons of the hunt. Their successors Guy Laking, F. H. Cripps-Day, and Charles ffoulkes, whose numerous works cover most aspects of the subject, were mainly enthralled with the grandeur of the past. Amongst the panoply of great armours and swords the finely-decorated firearm and crossbow had their place, but the humble hanger was scarcely worthy of mention. Bashford Dean's *Catalogue of European Court Swords and Hunting Swords* of 1929 was the first book to give prominence to a sporting weapon, but Dean's interest was mainly concerned with the artistic qualities of the finer hunting swords and he did not bother to conceal his contempt for their status as weapons.

In 1937 P. Carrington-Peirce, somewhat apologetically, published his little *Handbook of Court and Hunting Swords*. Writing at a time when there was a 'shortage of domestic servants and the consequent fashion for smaller houses' he was careful to point out that the swords were 'still to be purchased at prices well within the reach of those thousands of collectors of antiques who look carefully at a ten-pound note before parting with it'. Thirty years later it was still possible to buy a hunting hanger at less than that price, such are the vagaries of sale-room prices and the whims of the collectors' market. In 1937, also, the great International Hunting Exhibition was held in Berlin, an important event which stimulated interest all over Europe. Its effects, however, were not to be felt until after the war when hunting museums began to be established in nearly every

country. Books on hunting and hunting weapons inevitably followed, but all too often the authors of the latter have devoted their attentions mainly to the sporting gun, or rather the decorated gun, and the reader has been presented with yet another history of the firearm. To be fair it is not easy to avoid this, for amongst all the hundreds of sixteenth- and seventeenth-century books on hunting there is scarcely a paragraph in which a bladed weapon is described in detail. On the procedure and customs of the hunt, the training and care of the hounds, the lore of the countryside, the life and habits of the prey, information can be found in abundance, but on the weight and length of a spear or the shape of a sword hilt there is but a sentence here and there. In the beautiful woodcuts and engravings which illustrate these works the artists have so often used some stereotyped representation of a sword or spear so that little knowledge can be culled from these sources.

In this book, which is intended primarily for the collector, I have tried to describe as many as possible of the great armoury of weapons used in the hunt, including some weapons which arms historians are frequently happy to relegate to the realm of ethnography. But if one is writing about crossbows then one cannot by any justification ignore the Fan crossbow; the throwing weapons of the aborigines have as much right to inclusion as the Spanish dart; and if one brings in the English medieval sling why ignore the fact that slings were used extensively elsewhere? Unfortunately in order to describe all hunting weapons one faces the perils of trying to bring within the compass of a single volume a history of weapons from the stone axe and wooden spear to the revolver and the rocket, a manifestly impossible or, at the least, uncomfortable task. Weapons of antiquity have, therefore, been touched upon briefly at the beginning of each section and, although I have given some notes on the development of each class of weapons, I have had to assume, rightly I hope, that the reader has some knowledge of the subject.

Having carefully stressed the difficulties of writing this book in an endeavour to conceal its shortcomings and to excuse its long preparation, may I equally emphasize the help which friends and colleagues have given me. I would particularly like to thank Mr. A. R. Dufty, the Master of the Armouries in H.M. Tower

of London, who by his encouragement has made all things possible. I owe a special word of thanks to Miss Sarah Barter and Mr. H. R. Robinson of the Tower of London and to Mr. A. V. B. Norman of the Wallace Collection for their unselfish sharing of knowledge. To the following I gratefully acknowledge much advice, practical assistance, and kindly answers to tedious letters: Mr. John Arlett of Wilkinson's Sword Company; Dr. Finn Askgaard; De Witt Bailey II; Mrs. Eileen Beer; Dr. Ortwin Gamber of the Kunsthistorisches Museum, Vienna; Lt. P. J. Gibson; Mr. Arthur Grimwade of Christie's; Mr. John Hayward of Sotheby's; Mr. Eugen Heer; Dr. Arne Hoff, Director of the Tøjhusmuseum, Copenhagen; Mr. C. O. von Kienbusch; Mr. Gerald Mungeam; Dr. R. Natta-Soleri; Lt. Cdr. W. F. Paterson; Mr. Harold L. Peterson, Chief Curator, National Park Service, U.S.A.; Mr. W. Reid, Director of the National Army Museum; Mr. B. W. Robinson, Keeper of the Metalwork Dept., Victoria and Albert Museum; Mr. J. G. Scott, Keeper of the Department of History and Ethnography at the Glasgow Museum and Art Gallery; Mr. F. Wilkinson, Secretary of the Arms and Armour Society. In the preparation of the text illustrations I have been fortunate to call upon the assistance of the artists Mrs. Blanche Ellis and Frank Dickinson and that great photographer Jeremy Hall. Finally I must mention my old friend Claude Blair, who has so often in the past played the genial role of mentor and who has on this occasion donned the stern mantle of Editor.

H.L.B.

Wildwood
Caterham, 1970

Introduction

The traditional view of hunting was that voiced in the ditty printed in *Cynegetica* (London, 1788):

> Hunting's an old and honourable Sport
> Lov'd in the Country, and esteem'd in Court;
> Healthful to th' Body, pleased to the Eye,
> And practis'd by our old Nobility.

Individual hunters might seek primarily for food, but from classical times onwards this was a secondary reason for the organized community or court hunt. It was the sport itself that was the attraction. It afforded the red-blooded excitement of war without its attendant costs and miseries. Like combat, the hunt was regarded as physically strengthening, mentally stimulating, and aesthetically satisfying. Thus William Somervile opined in *The Chace*, in 1735: 'It is most certain that Hunting was the exercise of the greatest heroes in antiquity. By this they form'd themselves for war; and their exploits against wild beasts were a prelude to their future victories. Xenophon says that almost all the ancient heroes, *Nestor*, *Theseus*, *Castor*, *Pollux*, *Ulysses*, *Diomedes*, *Achilles*, etc. were *Disciples of Hunting*.'

By the Middle Ages, the hunt was the social event around which the life of the village and certainly that of the court revolved. The main events were the hunting of the stag in the spring and summer, and the boar in winter. The procedure and etiquette of the hunt were strict. Huntsmen known as harbourers or lymerers tracked the animals to their coverts, marking the routes and collecting the fewmets or droppings as evidence of the age and condition of the quarry. All good books on hunting gave advice on how to read these tell-tale signs of a good or bad run. The fewmets were presented with solemn ceremony at the hunt breakfast and plans for the day made accordingly. Thus prepared the chase of one animal after another would continue all day. There were rituals connected with the opening of the carcasses. The genitals were displayed in triumph;[1] the 'heart bone', a

cartilage found in the heart, was preserved for medicinal purposes, and the antlers often became treasured trophies. They were the subject of special studies and one of the longest series of engravings of the sporting artist Johann Elias Ridinger (1698–1767) is his *Wundersamste Hirsche*, consisting of 100 plates of stags with outstanding or curious sets of antlers. Enormous collections of these trophies were amassed at the great hunting castles of Moritzburg in Saxony, Meersburg in Switzerland, and Kranichstein in Hesse Darmstadt. So highly prized were some specimens that, in 1727, the Elector Frederick of Saxony exchanged a company of grenadiers for a head of antlers of sixty-six tines, shot by the first King of Prussia when Elector of Brandenburg in 1696.

To most European princes it was a point of honour to excel at the hunt. The Emperor Maximilian I endeavoured to perpetuate his own exploits by publishing illustrated accounts of them in *Theuerdank* and *Der Weisskunig* (see pp. 4, 187). Henry VIII who tried to emulate the Emperor in many things was an enthusiastic hunter. In August 1520, his secretary Richard Pace wrote to Wolsey: 'the King rises daily except on holy days, at 4 or 5 o'clock, and hunts till 9 or 10 at night. He spares no pains to convert the sport of hunting into a martyrdom.'[2] Courtiers seem to have suffered much in this fashion. So did the people of the countryside who not only had to stand by meekly and see the royal game eating their crops, but suffered untold damage when the royal hunt came their way. One of the most fanatical of royal hunters was James I. One day in 1604 his favourite hound, called Jowler, was abducted, much to his annoyance. The following day the hound reappeared on the field with a note in his collar: 'Good Mr. Jowler, we pray you speake to the King (for he hears you every day, and so doth he not us) that it will please his Majestie to go back to London, for else the country wilbe undoon.'[3] But the King was not noted for his sense of humour or his sympathy for commoners and his riding to hounds continued unabated. By 1607, however, his ardour began to cool slightly and Sir George Chaworth was able to report 'the King . . . ys not so earnest, without all intermission or respect of wether, be yt hott or could, drye or moyst, to goe to his hunting and haulking as he was; for although he be as earnest, being at yt, as he was, yet ys he more apt to take hould of a lett and a reasonable wynd will blowe him to, and keepe him at hawe all daye.'[4]

Something of this ennui slowly spread throughout Europe and the hazards and hardships of the chase were no longer regarded as essential to the sport. The firearm began to dominate the hunting field and the practice of driving the game on to the guns became the fashion. This procedure grew more and more elaborate as princes endeavoured to out-rival each other in the most bizarre *coup de théâtre*, the most extravagant pageantry, in which hundreds of stags, boars, and other game were shot down from the galleries of great temples and pavilions erected in the forests. When Isidro Solér wrote his *Compendio Histórico de los Arcabuceros de Madrid* in 1795, he followed the time-honoured line of emphasizing the merits of the hunt with its benefits to the mind and the body, but he was careful to tone down any suggestion of undue exertion: 'the exercise of the Chase is the most pleasing, useful and entertaining diversion, because at the same time as it delights the mind, making it forget all the cares and solitudes of life, it fortifies and lends agility to the body by a *moderate* fatigue . . .'

In England, at the beginning of the nineteenth century, however, a spartan attitude to sport still prevailed. There was no luxury about shooting. Hard exercise and few comforts were the conditions of all pursuits of game. It was a time when sportsmen seemed to take a delight in braving the most appalling weather conditions for the sake of little or no return. Wildfowlers of the breed of Colonel Peter Hawker (1786–1853) were prepared to spend a winter's night on the marshes, wet and frozen, in order to get one shot at a morning flight. In his *Diary* for the year 1820 Hawker reported, on 15 January, that 'two men were this night frozen to death in their punts'. Nothing daunted, he got his own punt ready on the 28th, and duly recorded that he was 'out from 7 at night till 7 the next morning . . . impossible to get a shot . . . never was I out in a more miserable trip.'

The Victorian sportsmen and writers also liked to stress the physical hardships and dangers of the hunt—sometimes with unconscious humour. Gordon Cumming, who became a popular hero after the publication of his *Five Years of a Hunter's Life in the Far Interiors of South Africa*, advised his readers that to become

a successful lion hunter 'a recklessness of death, perfect coolness and self-possession, an acquaintance with the disposition and manners of lions, and a tolerable knowledge of the use of the rifle are indispensable . . .' H. A. Leveson, another sportsman of great distinction, wrote under the *nom de plume* of 'The Old Shekarry'. Although, like Hawker, he was plagued with war wounds, he hunted all over the world. His exploits, recounted in such thrilling fashion and full of hair-breadth escapes, are usually cast in the heroic mould. In *Sport in Many Lands* (1877), for instance, he becomes briefly a chamois hunter 'accustomed to have death stalking besides him as a companion, and to meet him face to face'. This initial effect is spoilt by his description of subsequent events. He and his companion eat a substantial breakfast (full menu given). Taking with them some tins of *pâté-de fois gras* 'in case of any scarcity of provisions *en route*' they fortunately find a comfortable hostelry. Here they dine well and are waited upon by 'a buxom-looking damsel who did not scruple to show herself *passionée* for my handsome companion'. But all is well in the end. The hunters resist distraction; a chamois is spotted and, with his Westley Richards breech-loader with its precision Whitworth barrel, Leveson kills it comfortably at a range of 300 yards.

Theodore Roosevelt who delighted in well-equipped hunting expeditions wrote in his foreword to Baillie-Grohman's *Master of Game* (1904) a denouncement of all the bad old ways of hunting and all those who 'followed the chase in ways which made scant demands upon the hardier qualities either of mind or body. Such debased sport was contemptible then; and it is contemptible now. Luxurious and effeminate artificiality, and the absence of all demands for the hardy virtues, rob any pastime of all title to regard. Shooting at driven game on occasions when the day's sport includes elaborate feasts in tents on a store of good things brought in waggons or on the backs of sumpter mules, while the sport itself makes no demand upon the prowess of the so-called sportsman, is but a dismal parody upon the stern hunting life in which the man trusts to his own keen eye, stout thews, and heart of steel for success and safety in the wild warfare waged against wild nature.'

Behind all the brave talk, the stories of doughty deeds and true sportsmanship, unfortunately lay the darker side of hunting

—the blood lust and the cruelty. The Romans set an early example with their *venationes* in which men fought animals and animals were forced to fight each other in the confines of an arena before the yelling mob. This kind of artificial hunting was revived in the sixteenth century. In England it took the form of bull and bear baiting. The Elector Johann Georg I of Saxony (1611–56) was the most enthusiastic organizer of arena battles using the great open market at Dresden for his stage. Here aurochs brought from the Polish forests were matched against bears, wild boars against wolves and stags. The Elector himself would on occasion enter the arena to dispatch an animal with his spear. These court entertainments culminated in the disgusting sport of fox tossing. This was done by two persons standing about 20 or 25 ft. apart holding the ends of slings made of webbing or cord. The centre lay slack on the ground. As the terrified animals were driven across the arena, the tossers pulled the ends jerking the animals high into the air. The ground was covered with saw-dust or sand so as not to kill the wretched beasts too quickly. A number of mixed couples took part at the same time, the rivalry between the separate couples giving zest to the cruel amusement. At a famous contest held at Dresden by the Elector of Saxony, Augustus the Strong (1694–1733), 687 foxes, 533 hares, 34 badgers, and 21 wild-cats were tossed to their deaths. At the end 34 young boars and 3 wolves were turned into the enclosure 'to the great delectation of the cavaliers, but to the terror of the noble ladies, among whose hoop-skirts the wild boars committed great havoc, to the endless mirth of the assembled illustrious company.'[5] The *Handbuch für Hetzliebhaber*, published in 1794, describes how combats between lions, leopards, bears, wolves, and lynx were staged in an amphitheatre in Vienna. In return for free seats people were encouraged to bring their dogs to attack the animals in the arena.

It was not only on the animals that so-called sportsmen vented their sadistic instincts. Harsh laws were designed to keep the countryside free for the local lord's game and terrible punishments were meted out to poachers. In 1537 a farmer was found with a dead stag on his own field. The Archbishop Michael of Salzburg ordered him to be sewn up in the skin and given to his hungry pack, he himself blowing the *Morte* while the ravenous brutes were tearing the man to pieces. A peasant found with a

hare under his coat had it forced down his throat.[6] In eighteenth-century England the starving cottager caught trapping a rabbit could be transported for seven years. Mantraps and spring guns were used indiscriminately for the protection of pheasant preserves.

Of course, one has to judge men's behaviour by the standards of the time. However indignant the populace might be at the restrictions on their liberty the senseless slaughter of animals left them unmoved. As now the hunter viewed his prey with a mixture of admiration and ferocity. The stag was lauded for its nobility and the boar for its courage. Thus the Toast of the Master of the Hunt, given by Leveson in *Sport in Many Lands* (1877), after first extolling 'woman's lovely face, beaming eye and bosom fair', went on:

Pledge me next the glorious chase,
When the mighty boars ahead,
He, the noblest of the race,
In the mountain jungle bred
Swifter than the slender deer
Bounding over Deccan's plain,
Who can stay his proud career,
Who can hope his tusks to gain?

His version of a hunt dinner's 'opening lay' began:

The boar, the mighty boar's my theme,
Whate'er the wise may say—
My morning thought, my midnight dream,
My hope throughout the day;
Youth's darling spirit, manhood's fire,
Firm hand and eagle eye,
Must they acquire who dare aspire
To see the wild boar die![7]

On the other hand the otter, a small and fascinating creature, was attacked with apparent maniacal fury. He is referred to in such terms as a 'cruel tyrant', a 'midnight pillager', a 'sly goose-footed prowler'. William Somervile described an otter hunt in detail in *The Chace* (1735). Here is the end of the hunt:

Again the crowd attack. That spear has pierc'd
His neck; the crimson waves confess the wound.
Fix'd is the bearded lance, unwelcome guest,
Where-e'er he flies; with him it sinks beneath,

With him it mounts; sure guide to ev'ry foe.
Inly he groans, nor can his tender wound
Bear the cold stream. Lo! to yon sedgy bank
He creeps disconsolate; his num'rous foes
Surround him, hounds and men. Pierc'd thro' and thro',
On pointed spears they lift him high in air;
Wriggling he hangs, and grins, and bites in vain:
Bid the loud horns, in gayly-warbling strains,
Proclaim the felon's fate; he dies, he dies.

Nevertheless all the animals were painted and drawn in loving detail and their images used as decoration on the hunters' weapons.

Only in the eighteenth century did consciences begin to stir and the first protests against cruel practises emerge. Some of these, however, struck a ludicrous note. In 1780, 'A Gentleman' [Richard Gardiner] published *September, A Rural Poem*, a pamphlet criticizing the indiscriminate shooting of the parent birds:

O! where must now their wretched offspring fly?
No bush, no brake escapes the sportsman's eye.
In turn progressive each resigns its breath.
And close their eyes in agonising death.
Is this a triumph? This that manly pride
Which boasts so much of reason for its guide?
To view unmov'd the mangled covies die,
And rob Creations to enrich a pye.

In 1818 John Lawrence in the *Sportsman's Calendar* appealed for 'the merciful treatment of all brute animals as a moral duty'. In October 1825 Lady Kennedy, a dutiful follower, attended the shooting contests at the Red House Club, London, and was upset at the use of live pigeons for targets. She tied a small piece of white paper round the leg of each bird with the kind intention of making it fly zigzag fashion and so increase its chances of survival. The actual result was to impede its flight and 'there was much laughter among the spectators'.[8] In 1847 Mrs. D. Hanbury published *One Day in the Life of a Stag*, an appeal against the cruelty of modern stag-hunting.

Many sportsmen, however, continued to display an unbelievable callousness. This can be seen in such events as the massacre of the buffalo (see p. 285). Sometimes it occurred in isolated

incidents. In 1825 Lord Middleton indulged in a shooting match with a gamekeeper, one of the conditions being that each man should carry what the other shot. The keeper being the better marksman Lord Middleton began to get tired of his burden, so he deliberately shot a young donkey which he insisted the keeper should carry.[9] Even the kindly Peter Hawker did not hesitate to shoot his young untrained dog when it made itself a nuisance on a hunting expedition in France. Some of the most heroic-sounding authors condemned themselves with their own writings. Who cannot be sickened by Gordon Cumming's account of the killing of the largest bull elephant he ever encountered. His first shot rendered the animal dead lame so that it limped to the shelter of a tree from which it eyed its tormentors with a 'resigned and philosophic air'. Cumming went on:

I resolved to devote a short time to the contemplation of this noble elephant before I should lay him low; accordingly having off-saddled the horses beneath a shady tree which was to be my quarters for the night and ensuing day, I quickly kindled a fire and put on the kettle and in a few minutes my coffee was prepared. There I sat in my forest home, coolly sipping my coffee with one of the finest elephants in Africa awaiting my pleasure beside a neighbouring tree. . . . Having admired the elephant for a considerable time I resolved to make experiments for vulnerable points, and, approaching very near, I fired several bullets at different parts of his enormous skull. These did not affect him in the slightest; he only acknowledged the shots by a 'salaam-like' movement of his trunk, with the point of which he gently touched the wound with a striking and peculiar action. Surprised and shocked to find that I was only tormenting and prolonging the sufferings of the noble beast, which bore his trials with such dignified composure, I resolved to finish the proceedings with all possible dispatch; accordingly I opened fire upon him from the left side, aiming behind the shoulder; but even there it was long before my bullets seemed to take effect. I first fired six shots with the two-grooved, which must have eventually proved mortal, but as yet he evinced no visible distress; after which I fired three shots with the Dutch six-pounder. Large tears now trickled from his eyes, which he slowly shut and opened; his colossal frame quivered convulsively, and falling on his side, he expired.

There was another aspect to the hunt which serves to bring this Introduction to an end on a lighter and more amusing note. The sport, as we have read, was considered to be stimulating to the senses. The notion that hunting and love-making had something in common was widely held.[10] There was a physical analogy—the pursuit, the struggle, and final conquest with its shedding of blood. Commenting on the spots of blood left by a wounded animal Charles Boner, in *Chamois Hunting* (1853), wrote the curious verse:

A flower thus stained, to the hunter brings
More joy than the reddest rose;
It telleth a tale to his heart as dear
As the blush that doth all disclose.

Ladies of the court often attended the hunt and offered diversions at the end of the day to men already heated by the excitements of the chase. Their presence made the punishment of 'blading' (see p. 63) an hilarious and stimulating event. In one of the fifteenth-century tapestries in the Victoria and Albert Museum, known as the Devonshire Tapestries, a deer is being disembowelled by a huntsman and a hound eagerly dives into the gory mess. Just behind, another huntsman avidly grasps the breast of a woman. In the Louvre, Paris, the tapestries known as *Les Chasses de Maximilian* of *c.* 1525, depict a couple making love while the hunt assembles in the background. The original French 1561 edition of Du Fouilloux's *La Venerie* gave instructions for the necessities of a field cart or *charrette de chasse*. These included a sprightly lass of sixteen or seventeen to scratch the seigneur's head[11] to while away the weariness of the journey.

In poetry and sŏngs the hunt and love-making were figuratively associated. Bawdy puns were used extensively in hunting songs such as the seventeenth-century 'The Hunting of the Hare's Garland'. 'Questing for coney' or 'hare' meant the pudendum, sometimes referred to as a cunny-skin. The meaning applied to deer as well. A deer which had been 'wounded' by someone else was reckoned easy meat. In the eighteenth-century 'The Ewie wi' the Crooked Horn's Garland' the Keeper's song went thus:

There was a Keeper a shooting did go,
And under his cloak he carried a bow,
Twas all for to shoot the merry doe,
Among the leaves so green O,
  Jacky, master, sing you well,
  Very well, with my hy, down, down,
  With my how down, down, etc.

The first doe he shot at he miss'd,
The second doe he hugged and kist,
The third doe went where nobody wist,
Twas hurry the leaves so green O,
Jacky, master, sing you well, etc.

The fourth doe jumped over the brook
The keeper catched hold fast with his hook,
What he did there you may go and look,
Twas among the leaves so green O,
Jacky, master, sing you well, etc.

The fifth doe jumped over a stile,
The keeper catch'd her fast by the heel,
There I believe he did both see and feel
Twas among the leaves so green O,
Jacky, master, sing you well, etc.

These extracts and comments give a rather patchy picture of the frailties and virtues of the men—and women—who used the weapons described in the following chapters. In the space of a few pages it is difficult not to give a distorted view. Princely hunts did indulge in their orgies of cruelty and lust; colonists abroad in countries swarming with game, with the newfound power of the cartridge gun in their hands, sometimes shot down every animal and bird in sight; the professional hunters, the whalers, the sealers, the buffalo and elephant hunters, ruthlessly swept the land and sea and exterminated many species, but it must not be forgotten that there was always the humble hunter working on his own, quietly taking his share of the game for the benefit of his family or for a brief measure of open-air sport. These were the men who studied the life of the countryside and grew to love animals, and prided themselves on never giving unnecessary distress to any living creature. To quote the words of Sir Samuel White Baker: '*All real* sportsmen whom I have met have been really tender-hearted men—men who shun cruelty to an animal and who are easily moved by a tale of distress.'

Rewards of the Chase. Woodcut by Jost Amman in Marx Rumpolt's *Ein new Kochbuch* (1581).

HUNTING WEAPONS
from the Middle Ages to the Twentieth Century

Chapter One

Swords

The most popular hunting weapons of antiquity were the bow and the spear, both weapons which enabled the hunter to keep a healthy distance between himself and his prey. In Egyptian and Assyrian wall paintings, sculptures, and frescoes, the huntsman with his bow or spear, safe in his chariot, is rarely shown carrying a sword at all. But, if necessary, for personal protection, the hunter relied on the fighting sword of the period, however impractical it might now seem. Assyrian mural sculptures of *c.* 884 B.C. in the British Museum show King Asshur-Na-Zirpal hunting lions with bow and arrow from his chariot. He wears a straight sword in a scabbard with two curious projections on either side of the chape. A votive shield in Tutankhamen's tomb (*c.* 1350 B.C.) portrays him killing lions with his *khopesh*, the popular sickle sword of the late Mediterranean Bronze Age.

The Greek warrior's *kopis* or *machaira*, very similar to the modern Gurkha's *kukri* is depicted on mosaics[1] and vase decorations of 300–100 B.C. being used to chop down lions and boars at apparently suicidal close quarters (Fig. 1). Scythian huntsmen on horseback with the bow and arrow as their primary weapon, carried the short *akinace* with its elaborate, decorated scabbard for hand-to-hand work. On Sassanian silver ware of *c.* A.D. 400–500, royal hunters can be seen stabbing and slashing at lions with their straight double-edged swords—acts of bravado for the record only probably.[2] All these swords were of the kind in general use, and, as far as one can tell from these and later illustrations, no sword was designed solely for the chase until the fifteenth century.

Much of this reluctance to use the sword stemmed from the

fact that the bronze and early iron swords were not often of sufficient length and strength to be used against a large and ferocious animal with reasonable safety. As the smiths developed their skills and techniques, however, the sword began to stand on its own as a hunting weapon. The long medieval sword with its broad, double-edged blade, capable of slashing through mail and plate armour, was brought into use. At first it was used mainly as a cutting weapon; but during the thirteenth century,

1. Greek huntsman attacking a wild boar with his *machaira*. Painted design on an Etruscan bowl of fifth century. Gallatin Collection.

with the improvements in the design of plate armour, the knight's sword had to be adapted for thrusting rather than cutting, in an endeavour to pierce an adversary's defence. For this purpose it was provided with a straight double-edged blade tapering to a point, the increased rigidity required being obtained by making the blade with a flattened diamond or hexagonal section. Manuscript illustrations of the thirteenth and fourteenth centuries show the huntsman mounted or on foot using a sword of this kind.

The Great Hunting Sword

In Walter de Milemete's *De Nobilitatibus, Sapientiis et Prudentiis Regum* of 1326–7[3] marginal paintings include scenes of bears and lions being attacked with these weapons. In one of the first

printed books on hunting, *Le Livre du Roy Modus*, published in 1486, a hunter on horseback leans from his saddle to thrust his pointed sword into a boar (Fig. 2). This was a dangerous procedure. One thrust of the fine point of such a sword would neither kill nor stop its onslaught, and the rider could be easily toppled from his saddle. The great fourteenth-century writer on hunting, Count Gaston de Foix otherwise Gaston Phoebus, considered that to kill a boar in this fashion when the animal was not held by mastiffs was the greatest feat of all and a 'fairer thing and more noble' than killing with a spear. But he gave careful instructions that the sword for this dangerous work

2. Huntsman using thrusting sword. Woodcut from *Le Livre du Roy Modus* (1486).

should have a blade 4 ft. long, the top half being left blunt lest it cut the leg when in close action.[4] This longer, heavier blade was soon introduced, although there is no indication that the blunting of the blade was carried into effect at this time.

In 1381 Mahieu de Tournay, the French royal sword cutler, made two 'espées larges . . . pour le roy et Mons. de Valois, à tuer le sanglier'.[5] Unfortunately there is no note of any special features on these large boar swords. By the end of the fifteenth century, however, a well-defined class of riding sword had developed which was used in the hunt. The supreme example is the sword of Maximilian I, now at the Kunsthistorisches Museum, Vienna (No. D 11) (Pl. 1). Made probably in 1497–8 by Hans Sumersperger of Hall in Tyrol, this has a long double-edged blade blued and embellished in *Goldschmeltz*

with religious inscriptions and scenes. There are straight quillons and a handsome grip of wood and ivory decorated with silver and mother-of-pearl. The sheath carried a set of eating knives.[6] In a woodcut in the *Theuerdank*, a book of adventures of the Emperor told in allegorical form, Maximilian faces an enraged boar holding one of these swords with the two hands in order to take the impact (Fig. 3).

3. The Emperor Maximilian I killing a boar with his sword. Note the use of two hands to take the impact. Woodcut from *Theuerdank* (1517).

Other swords in this class, of course, do not compare in magnificence and also differ in minor details. The majority have single-edged blades, triangular in section, and trebly grooved along the whole length so that they were suited for cutting and thrusting. The quillons are normally reinforced with some form of forefinger and thumb guard, usually a side-ring on one side

and a single arm of the hilt (so-called *pas d'âne*) joined to the quillon by a sloping bar on the other. The fluted and panelled grips have pommels of fish-tail form. Typical examples are in the Wallace Collection, London (No. A 697), in Dresden (No. M 53), and in the Klingenmuseum, Solingen (Inv. 43,30). In another type in this group, the grips and quillons are flattened and pierced with small circles or holes for decoration, and there is only a rudimentary form of thumb-guard. One of these swords is in Castel Sant'Angelo, Rome (No. 2625) and another fine example complete with its scabbard was in the Zeughaus, Berlin.[7] Of even plainer construction are those which have two staghorn plates riveted on either side of the tang as a grip (Pl. 2). This form of grip with the rivet heads and washers made prominent for decoration was to become a characteristic feature of hunting swords and knives. It can be seen in Dürer's woodcut of *The Martyrdom of St. Catherine*.

The same artist, in his famous engraving of *St. Eustace and the Mystical Stag*, *c.* 1505, however, arms the saint with what is usually described nowadays as a 'hand-and-a-half' sword. This type of fighting sword was carried in a scabbard which contained a set of eating knives and a bodkin. Its blade could be used for cutting or thrusting and was long enough to be used against a large animal from horseback; its handle could be held by one or two hands. In hunting scenes showing the wealthier town or country folk of the early sixteenth-century the men are armed with this type of sword (Fig. 4). In the Germanisches National-museum, Nuremberg, there is a self-portrait of *c.* 1500 by the Kappenberger Master which portrays him in hunting dress wearing one of the swords.[8] In the painting by Lucas Cranach the Elder of the hunt given by the Emperor Charles V for the Duke of Saxony in 1550, now in the Prado, Madrid, the Princes are depicted wearing fine long-handled swords. The *Relacion*, the inventory of the armoury of Charles V, drawn up after his death in 1558, described one of these swords as 'a hunting sword, with two-handed grip with hilts, the quillons ornamented with velvet, the pommel gilt; little knives in the sheath (*Una espada de monterfa empuñadura de dos manos con guarnicion la cruz guarnecida de terciopelo y pomo dorado, unas nabajuelos al yerro*)'.[9]

The normal pattern of the hunt was the wild chase through the countryside, the dogs flushing and eventually cornering the stag,

4. Huntsmen wearing hand-and-a-half swords. Detail from a sixteenth-century engraving by an unknown German master.

boar, or bear. The kill was administered by the thrust of a heavy blade. Against the last two animals the ordinary blade of a sword would have sunk too far in, bringing the hunter within range of the animal's teeth and claws and the blade could be easily snapped off. The final blow was therefore left to a huntsman with a stout spear. The hilt of the hand-and-a-half sword, however,

was of useful size and shape, and it was to this kind of hilt that was often fitted the special types of blades designed for the hunt.

Boar Swords

The first of these types of blade, making its appearance in the first half of the fifteenth century, had a triangular, square, or octagonal section along its entire length. Known as the *estoc*, or, in Britain, the tuck, it was used both as a cavalry weapon and for fighting on foot in the lists. Its great thrusting powers were an asset in hunting. In 1514, at a boar hunt in France organized by the Dauphin, it was reported that 'My Lord Suffolk met the first [boar] and gave him the first stroke with his tokke, that he bowed it three ways to his hand, and slew him.'[10] An inventory of Henry VIII's arms and armour taken after his death in 1547 includes the items: two 'iij edged tockes wt vellet skaberdes' and six 'bore spere swordes wt lether skaberdes'. In Tower Inventories of 1611 and 1629 the latter appears as 'tuckes for the wild boar'.[11] A most unusual tuck in Henry VIII's collection was described as 'a longe Tocke gilte wt gonnes having a locke and skaberde of blac vellut the crosse and pommell guilte.'[12] This may be the sword in the Tower of London Armouries (No. XIV–10) which has a diamond-sectioned blade 4 ft. 2 in. long, straight, pointed quillons, and a long handle made of a hand gun 1 ft. 10 in. long. In the 1542 Inventory of the Armoury of the Gonzagas at Mantua were '2 hunting estocs of round section (*dui stochi da cacia tandi fatti*) made in the manner of those of his Imperial Majesty'. There was also 'a hunting sword of estoc type (*un arma da cacia in foggia de stocho*)'.[13]

The construction of the estoc's blade enabled it to withstand the impact of a heavy animal far better than the normal broad blade, but unlike the latter it did not inflict a large wound. There was also the possibility that the blade would pierce the boar so deeply that it would bring the hunter into dangerous proximity with the enraged beast's tusks. The solution was to fit the end of the tuck's shaft with the normal boar-spear blade, which had a broad cutting edge and a crossbar or stop at its base. This appears to have first been done in *c.* 1500. In 1512 the Emperor Maximilian I dictated to his secretary, Marx Treitsaurwein, the details of a triumphal procession which he desired to be painted in his honour. The scenes were subsequently copied in a series

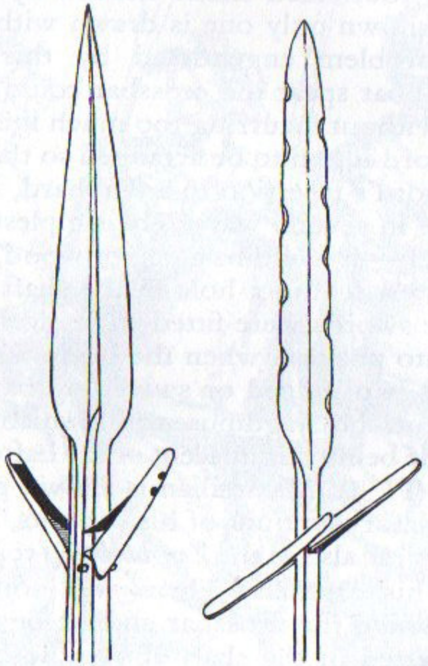
5. Detail from the *Triumph of Maximilian* (1526). Boar hunters with their 'new' boar swords.

of woodcuts by Hans Burgkmair and other artists.[14] There were numerous processional groups illustrating the Emperor's triumphs and pleasures—hunts, tournaments, musicians, etc. One group consisted of five boar hunters on horseback, carrying what were described as their 'new boar swords and spears' (Fig. 5). These had hand-and-a-half hilts, the blades being composed of strong four-sided shafts headed by spear blades. Of the five swords shown only one is drawn with a crossbar. This illustrates the problem engendered by this type of sword. Whereas on the boar spear the crossbar could be fitted as a permanent feature without incurring too much inconvenience to the user, on the sword it had to be arranged so that it did not interfere with the sword's insertion in a scabbard, if possible.

This was done in several ways. The simplest was to carry the crossbar separately—it could be a peg of wood, bone, or metal—and jam it or screw it into a hole in the shaft when action was imminent. Some swords were fitted with ingenious folding bars which sprang into position when the blade was pulled from the scabbard; others had hinged or swivelling bars (Fig. 6).[15] One sword in the Deutsches Jagdmuseum, Munich has a disc-shaped stopper, the blade being reminiscent of the hafted weapon known as the awl pike (Pl. 3). Maximilian is shown using one of these pikes in the laudatory account of his exploits, *Freydal*, published in 1512. They appear also in the *Zeugbücher* (1504–19), the pictorial inventories of his arsenals. There was some divergence of opinion as to where the crossbar should be positioned, but it was usually inserted in the shaft above the blade to allow the latter full penetration.

Nearly all the boar swords conform to the principle laid down by Gaston Phoebus (see p. 3) that the upper part of the shaft should be blunted, and, accordingly, this part has a round, square, triangular, or hexagonal section. Ideas about the length and shape of the blade, however, varied considerably. The sword of Philip the Handsome, Duke of Burgundy (1482–1506) and King of Spain (1504–6), now in the Kunsthistorisches Museum, Vienna (No. D 9), has a short, wide blade. The Wallace Collection German sword (No. A 698), of *c.* 1510, on the other hand, has a long narrow, spear blade. On some blades the edges were waved in the flamboyant fashion presumably to give a saw effect.

In spite of its unorthodox design the boar-spear sword achieved a surprising popularity. Artists in every medium illustrated its use. An interesting example is the engraved bone plaque on the wheel-lock gun given by the Duke of Bavaria to Ferdinand II in 1626, now in the Bargello, Florence (No. M 233). The stock bears the initials of Hieronymus Borstorffer of Munich and his



6. Boar-sword blades with special crossbars.
Left: Folding bars which spring out when the sword leaves its sheath. French, *c.* 1500 (*Bargello Museum, Florence*).
Right: Detachable bar with spring retaining clip. Danish, *c.* 1550 (*Tøjhusmuseet, Copenhagen*).

engraving shows an unusual method of holding the sword in a fight with a bear.[16] In such favour was the boar-spear type of blade held, in fact, that it was fitted to almost every kind of hilt including that of the rapier, and its popularity did not begin to wane until the end of the seventeenth century. By necessity it was a utilitarian weapon and was usually of unembellished finish, but occasionally this specialized form of sword was given the treatment reserved normally for a princely suite of arms. In the

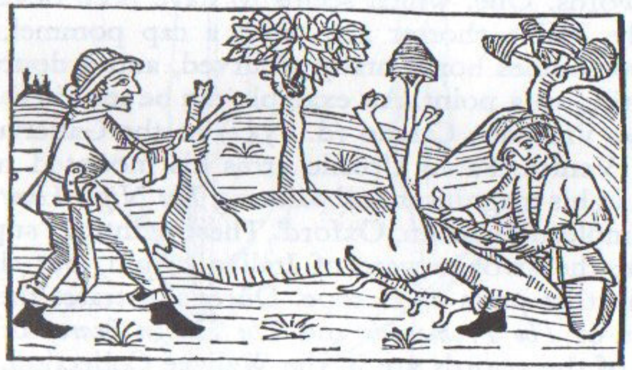
Armoury of the Gonzagas at Mantua in 1543 was 'a boar sword with the blade engraved and gilt with furniture and pommel of iron.'[17] Perhaps the finest example is the specimen formerly in the Zeughaus, Berlin and now in the State Historical Museum, Moscow. This has a chiselled- and gilded-steel hilt by Daniel Sadeler and a blade by Ulrich Diefstetter, both craftsmen of Munich in *c.* 1615–20.

Short Swords

All the swords so far described were large weapons averaging 4–5 ft. in length, and while ably performing their task in the final struggle with a large wild animal were decidedly inconvenient in a long chase through wooded country. For this, many mounted huntsmen preferred a smaller version of the great Maximilian hunting swords. One, which seems to have been developed in North Italy, had a shorter grip with a cap pommel, straight quillons, sometimes horizontally recurved, and a double-edged blade tapering to a point. An example can be seen in the picture of *Judith* by Vincenzo Cateno (d. 1531) in the Galleria Querini Stampalia, Venice. Paolo Uccello arms his mounted huntsmen with them in his magnificent oil painting *The Night Hunt* (*c.* 1465) in the Ashmolean Museum, Oxford. These paintings support the theory that the swords were of Italian origin, but they were popular in other parts of Europe. Dürer illustrates them in his engravings of *The Promenade* and *The Ensign Bearer* of *c.* 1500. Examples of the swords are in the Wallace Collection, London (No. A 499) and in the Germanisches Nationalmuseum, Nuremberg.[18] It was a general purpose sword which could be carried on most occasions and was apparently equally liked by landsknecht, courtier, official, and townsman.

The various hunt servants and followers on foot preferred an even shorter sword. What was needed was a weapon of convenient length which could be used for hacking away undergrowth as well as dealing a wounding blow. What developed was something between the great curved-bladed falchion, which appears on so many grand paintings and tapestries, and the *Hauswehr* or peasant knife, which served for a multitude of household and forestry tasks. The huntsman employing the crossbow or spear as his main weapon also found a short sword useful for personal protection. A scene in one of the Devonshire

Hunting Tapestries of *c.* 1425–50 in the Victoria and Albert Museum, London, shows how necessary this was on occasion. A bear has been cornered and a huntsman fallen under the enraged animal lunges desperately upwards with a curved-bladed sword. This has a straight cross-guard and plain, riveted grips. It is similar to the sword on the effigy in Newland Church, Gloucestershire of Jenkin Wyrall, a forester-of-fee, who died in 1457. The huntsmen depicted in the Bear Hunt of the Herzog Berchtold von Zahringen in Diebold Schilling's *Bern Chronicle* of 1484, in the Stadtbibliothek, Bern, are similarly armed.[19] In the 1486 edition of *Le Livre du Roy Modus*, a huntsman wears a short sword with a wide cutting blade, the hilt with riveted grips and a guard with a knuckle bow (Fig. 7).



7. Cutting up the carcass. Woodcut from *Le Livre du Roy Modus* (1486).

From *c.* 1500 onwards many of the short hunting swords had a more elaborate hilt. In the Flemish series of tapestries known as the 'Hunt of the Unicorn', which date to *c.* 1500 and are now in the Metropolitan Museum, New York, one of the huntsmen wears a short, straight sword whose scabbard contains a small knife. The hilt has a knuckle-guard, down-drooping quillons and an asymetrical pommel.

In Jean de Clamorgan's *La Chasse du Loup*, published in Paris in 1563, many of the huntsmen are shown wearing a small falchion-type sidearm. Haenel in his *Kostbare Waffen*,[20] illustrates a number of these swords, the blades varying in curve, weight,

and width, the hilts with cross- and ring-guards. A fine falchion hunting sword with staghorn grips, a chiselled- and gilded-iron hilt and a scabbard with compartments for smaller knives was formerly in the Armoury at Erbach, Odenwald, Germany.[21] An interesting example of the smaller hunting sword is that which belonged to Henry VIII and is now in Her Majesty's Collection at Windsor (Pl. 2). Made by Diego de Çaias[22] to celebrate the capture of Boulogne in 1544, it is just over 2 ft. long with a curved blade in a scabbard containing a small knife. The hilt has a knuckle-guard and down-drooping quillons.

It is probably one of the group of weapons found in the 'Guarderobe of the King's Robe' described in the 1547 Inventory of Henry VIII's arms as 'longe woodknives . . . of Dego his makinge . . . havinge skaberde of vellut, knives and Bodkin'.[23] Contemporary names given to these short hunting swords can be confusing. The English word woodknife appears frequently in records of Henry VIII's reign. Weapons bearing this name are described more fully in the 1547 Inventory quoted above. In the section devoted to the armoury at Westminster, appears the following:

> Itm twoo woodknyves of sondrie makinges the haftes guilte thone of them havinge a skaberde of grene vellet and thother a skaberde of blacke vellet wt Lockers and Chapes of Copper and guilte thone of them having a gerdell covered wt grene vellet and buckells studds and pend'nts of Copper and guilte.[24]

The King was obviously fond of these decorative items and he ordered many from his cutlers. During Christmas 1538 John Banks delivered to Greenwich 132 of 'the King's swords, skaynes, wood knives and daggers' which he had cleaned and repaired at 4d. each.[25] There are some grounds for assuming that the word 'woodknife' could, in some instances, have meant the heavy chopping knife and accompanying tools which are now usually described as a hunting trousse or *Waidpraxe* (see Chap. 2). A cutler's bill made out to Henry VIII just before his death in 1547 included 'a wodeknyffe shethe fowll of toweles . . . xijd';[26] a description which suggests the scabbard of one of these trousses. But, in fact, nearly all the various kinds of hunting or riding swords had sewn to the outside of their scabbards, one or more sheaths to house small knives, bodkins, or steels; and even

the much smaller belt knives often had a similar set of accessories in their scabbards.

The French word *braquemart* or *braguemard*, which Gay, in his *Glossaire*, defines as an *'epée courte, pesante, à un seul tranchant, le dos généralement droit et le taillant courbé vers la pointe'*, was apparently often applied to what we would now call a *couteau de chasse* or hunting sword. Cotgrave in his *Dictionarie* of 1612, in his turn, describes the braquemart as a woodknife, a whineyard, or a hanger. He also translates *malchus* (another word for a short, cutting sword) as 'a Fauchion, Hangar, Wood-Knife'. The word woodknife we have already seen in use. Whineyard, whinyard or, in its Scottish form, whinger is defined by Minsheu (*Compendium*, 1625) as a hanger. We thus arrive back at the third and the most common English word for a hunting sword—the hanger.

Hangers

One of the earliest references to the hanger or hyngler, to use its earlier spelling, occurs in the will of Thomas de la Mare of York, in 1358 (*'et meum cultellum vocatum Hyngler'*).[27] The word is found in many fifteenth-century English wills. One of 1427 refers to *'j hyngler de auratum'*. Another of 1450 mentions *'baslardum vocatum woodeknyffe'* and *'baslardum vocatum hanger cum yvorie hafte'*. The term 'baselard' is now used exclusively to describe the civilian dagger with an I-shaped hilt in which the quillons and pommel are often exactly balanced in length and size; but in contemporary usage it obviously had a wider connotation. The will of John Esterfield of 1504 includes his 'knife called an hanger'. In 1579 an inventory of the effects of Sir Thomas Butler lists 'hengers or skeynes'. Eight years later Robert Bruen describes his favourite sword as 'my dropper or hanger'.[28] Henry VIII's Inventory referred to above, which mentions his woodknives, also includes (at Westminster): 'a shorte hanger the hafte of bone wt a skaberde of white vellet the Locker chape and twoo other garnysshinges all of silver'; and (in the Guarderobe): 'one little shorte hanger the crosse locker & chape of copp wt thafte of cristall & the sheathe of vellvet wt a Knife and a Bodkin'. In 1532, as a New Year gift, Lord Rocheford had given the King two 'hyngers' with velvet girdles.[29]

From all these quotations it is not at all clear what was the difference between a hanger and a woodknife, if there was any

8. Bringing home the game. Huntsman with short hunting sword. From *Der Ander Theil dess neuwen Kunstbuchs* (1580).

difference at all. Included in the 1518 will of Sir William Wolstoncrofte is the bequest 'I gyve to Cristofer Boryng my hanger or woodknyf.'[30] An inventory of the Armoury at Burghley House, Stamford, in 1557, is also illuminating. Grouped under the heading 'Hangers' are the following:

ij woodknyffs wt vellett shethes one long othr short.
one hanger wt many tooles was my fathers.
one hanger wt knyff pr bodkg compass and hammer.[31]

The word hanger, then, was applied freely, as it is now, to all kinds of short swords or long knives which could be worn conveniently while travelling or hunting.

The English were particularly fond of the hanger. A French Ambassador, Marshal de Vieilleville, writing home to Henry II (1547–59), described his experiences amongst the sporting set in England:

The English are not so skilled in taking the stag as they are in marine matters. . . . They took me to a great park full of fallow-deer, where I mounted a Sardinian horse, richly caparisoned, and in company of forty or fifty lords and gentlemen we hunted and killed fifteen or twenty beasts. It amused me to see the English ride full tilt in this hunt, the hanger in their hand; and they could not have shouted louder had they been following an enemy after a hard-won victory.[32]

In the parish church of Walton-on-Thames, an engraved brass commemorates the feat of John Selwyn, a Keeper of Oatlands Park, who died in 1587.[33] During a stag hunt held in honour of Queen Elizabeth he leapt from his horse at full gallop on to the back of a stag. Guiding it towards the Queen he then plunged his short sword into the animal so that it fell dead at her feet (Fig. 9).

9. Engraving on memorial brass of John Selwyn at Walton-on-Thames, Surrey. This commemorates his feat of riding and killing a stag at Oatlands Park before Elizabeth I in 1587.

In other parts of Europe there were different ideas as to what constituted a convenient sword for the field. The sword of the Archduke Ferdinand II of Tyrol, *c.* 1560, now in the Kunsthistorisches Museum, Vienna (No. A 792), is of similar size and shape to that of Henry VIII's at Windsor, but the grip is carved from a piece of coral, the natural branch of the growth being left to form a flamboyant and most impracticable tassle. The small scabbard knife has a matching handle.[34] Another hunting sword in the Hermitage, Leningrad, has a sea-shell for a handle. These eccentric displays of the whims of wealthy patrons were early signs of some noblemens' desire to turn the hunt into a decorative spectacle.

Calendar Swords

An interesting feature apparently introduced in the first decades of the sixteenth century was a calendar of saints' days, often accompanied by zodiacal signs, which was etched or engraved on the blade of a sword. The majority of swords so treated were weapons of the hunting class. In 1532, as a New Year's gift, Sir Edward Seymour (his sister Jane later married the King) gave Henry VIII a sword with a gilt hilt and 'Kalenders' upon the blade.[35] In the Tower of London Armouries (No. IX–139) is a hunting sword with a sixteenth-century steel hilt whose surface still retains traces of gilt and silver floral patterns (Pl. 9). The blade, a later addition, is etched with a Gregorian calendar whose sections, showing the saints' days, are separated with the signs of the Zodiac in cartouches. Within a circle near the hilt are instructions for its use based on the year 1686. The grip is of staghorn. It is perhaps by no coincidence that around the date of Seymour's gift, seems to have been the period when the calendar was most popular. A number of these blades are signed by or bear the initials of Ambrosius Gemlich, the artist of Munich. Amongst his works, decorated in this fashion, are the chopper combined with wheel-lock pistol in the Metropolitan Museum, New York (Pl. 64), a similar knife in the National Museum, Cracow (without a pistol),[36] a hanger in the Kunsthistorisches Museum, Vienna (No. A 429), a hunting knife in the Nationalmuseum, Munich, and another formerly in the Zeughaus, Berlin.[37] These weapons range in date from 1528–40.

The *raison d'être* of these ephemerides is not easily explained.

But there was always a half mystical, half religious element in the art of hunting and results were considered likely to be better if the planets were in the right conjunction or the sympathies of an appropriate saint properly solicited. John Dee's *A Triple Almanacke for the yeere of our Lorde God 1591* gave the feast days for the Roman and Gregorian calendars and the Zodiacal signs, together with information on the course of the moon and the rising and setting of the sun. Also advised were 'right days'; the right days for planting and cutting of trees, the letting of blood, and so on. One notes, for instance, that 'it is good to Purge, the Moone being in the Watri trigon, viz in Cancer, Scorpio, or Pisces'. There was no advice for hunting but no doubt the well-trained hunter could do the requisite calculations from his calendar. The custom of engraving sword blades with these calendars continued into the seventeenth century. A hunting sword with calendar blade in the Kretzschmar von Kienbusch Collection, New York (No. 439), is dated to *c.* 1630; in the Metropolitan Museum, New York (No. 14.25.972), is a wide flat-bladed hunting knife with a silver-mounted staghorn hilt and a calendar for the years 1678–1700.

Combination Swords

Another interesting innovation of the sixteenth century was the combination of a sword and a firearm, the latter usually a wheel-lock pistol. A combined hunting cleaver and wheel-lock pistol has already been mentioned, and there were few types of swords which did not, at some time, form the subject of these experiments to make a dual weapon, or rather a weapon which held in reserve a vital shot for the swordsman to fire in an emergency. But whatever advantage these combinations had was more than offset by their clumsiness and weight. The wheel-lock pistol being the complicated mechanism that it was, there was never any guarantee that it would function as intended. The more one examines these weapons, especially such specimens as the long hunting rapiers and boar-spear swords fitted with wheel-lock pistols,[38] the more one is inclined to view them as mere mechanical gadgets and curiosities.

A more understandable modification and one of undoubted utility was the serration of the back edge of some swords so that they could be used for sawing through wood or bone. This feature was normally confined to the smaller hunting swords and those carried by the servants of the hunt. The provision of firewood or the cutting of a path through the underwood was not a chore relished by the noble sportsman. But, as we shall see, he was willing to share in the bloody business of dissecting the carcass, and there are examples of the great knightly hunting swords being provided with a saw-back edge. A few swords which had great chopping blades had their backs cut in this way. Notable specimens are in the Tower of London Armouries and the Deutsches Jagdmuseum, Munich (Pl. 39-40). Henry VIII's Inventory of 1547 also contained a woodknife with an ivory grip, a gilt pommel shaped like a griffin's head and 'the back of the blade beinge a Sawe'.[39] About the same time as the introduction of the saw-back there came a revival of the down-drooping, semi-circular flap found on some of the great swords of the fifteenth century. These served as a cover for the scabbard's knives and tools. A fine early example of a sword with these two features—shell-guard and saw-back—is the hunting sword in the Duke of Brunswick Collection.[40] The flat, down-drooping quillons and knuckle-guard end in scrolls, and a wide shell-guard is bent down over the blade. The single-edged straight blade has a saw-back. The bone grip is carved with hunting scenes, and the metal parts of the hilt are engraved, gilded, and encrusted with silver.

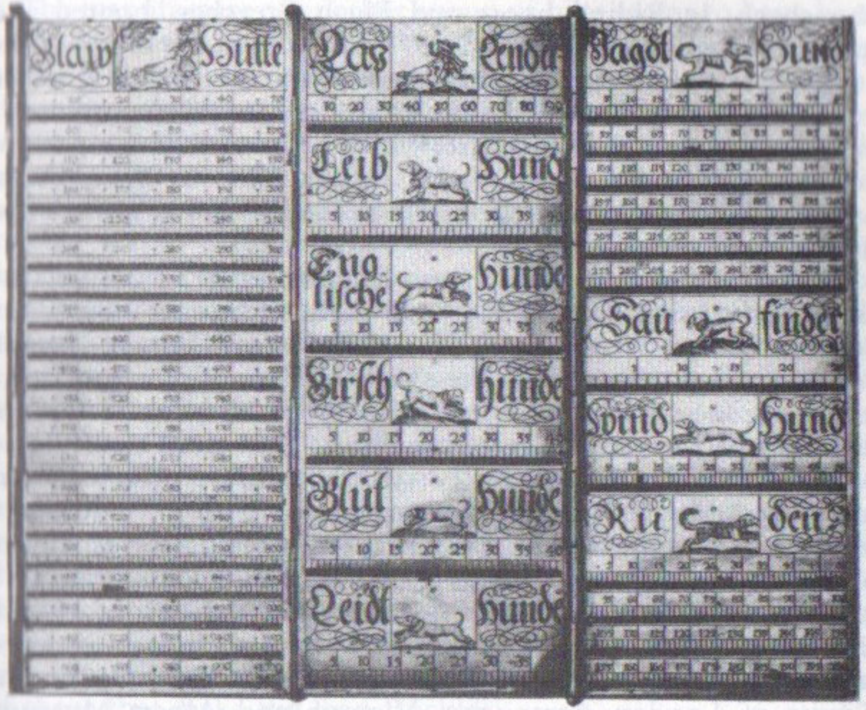
The Decoration of Swords

Rich decoration on a sword which would often be put to hard usage was by no means unusual. Early in the sixteenth century, artists were beginning to publish designs for gunmakers and sword cutlers to copy in the embellishment of their products. Hans Holbein the Younger, whose drawing of *The Dance of Death*, *c.* 1530, was reproduced on the sheaths of a group of Swiss and south German daggers, did several pen-and-ink drawings of the hilts and sheaths of rapiers, daggers, and a riding or hunting sword.[41] Other masters of the period, Heinrich Aldegraver, Urs Graf, and Hans Sebald Behan also produced similar designs. The pattern book of Filippo Orso of Mantua, dated 1554, contains some of the most fanciful of designs for sword hilts.[42] One of his drawings of a hilt with an eagle-head

chased, manubr de wier de argento magno de aurat in velvet virid, Capit et vagin falsse . . . viij li.[49]

Because the fashion of these heavy silver-encrusted hilts was fairly widespread in Europe it is not easy to identify an English sword of this period, but a large globular pommel is considered characteristic. The back sword with a rapier hilt, in the Tower of London Armouries (No. IX–916), is probably an example of the larger form of field or hunting sword. If we are to judge by paintings and illustrations in books and manuscripts of the seventeenth century nearly every kind of sword seems to have been worn to the hunt. Some of the swords, extravagantly decorated with hunting scenes, seem to have had little functional value at all. The hunting sword of the Emperor Ferdinand II, dated 1633, now in the Kunsthistorisches Museum, Vienna (No. D 243), has a cruciform hilt, the terminals cut with double eagles' heads and the grip, quillons, and large shell-guard inlaid with staghorn plaques. It is difficult to imagine using it without either breaking it or injuring one's hand.

Forming a curious group are those hunting swords fitted with game counters. The number and size of game killed was all part of the thrill of hunting and it was important that an accurate record should be kept. A rare German hunting calendar and game record of the seventeenth century is in the British Museum.[50] It is formed of eight brass hinged-leaves, divided into sections most of which are devoted to a particular kind of game—*Gemein Hirsch*, *Behre*, *Haupt Schwein*, etc. Each section is engraved with furrows filled with red wax and divided by numbered scales. The number of animals killed, in some cases, the total weight, and, for the hares, the number of miles covered, could be entered by marking the wax at the appropriate points on the scales. A calendar portion showed the times of the sun's rising and setting and the length of day and night for each week of the year. Other sections recorded the appliances and the number of dogs engaged (Fig. 10). The swords which supplemented this kind of instrument were nearly all of the kind with straight blades and small quillons. Circular counters were set into the long ricasso. Both the sword in the Scott Collection, Glasgow (Pl. 37), and that formerly in the collection of Prince Carl of Prussia[51] have three counters.



10. Part of a German hunting record and calendar of the seventeenth century (*Waddesdon Collection, British Museum*). These leaves recorded the number and kind of dogs employed.

The English Hanger

By the middle of the seventeenth century the firearm had supplanted the crossbow, the spear and, to a large extent, the sword as the main attacking weapon of the hunt. It is significant that the beautiful hunting garniture of Johann Georg II of *c.* 1660, now in the Historisches Museum, Dresden, consists, in the main, of a wheel-lock rifle and two pairs of flint-lock pistols, one pair for holsters and the other for the pockets. The only bladed weapons are a hanger and a chopper. But in England, the hanger retained its popularity as the hunting weapon proper. Reference has been made to a sixteenth-century commentary on the English sportsman and his love of hunting and riding (see p. 16), and it is noticeable how this national trait seems to have impressed itself on foreign visitors. One, commenting on the yeomen of Kent, wrote that they were 'commonly on

Horseback, in Riding boots and Plush Breeches, booted and spurred and always galloping . . .'[52] Apart from the fact that the hanger was the most convenient form of sword for riding to the hunt or for protection whilst travelling, the English sportsman's main quarry were deer and hare, which he hunted with a pack of hounds. Unlike his continental rivals faced with boar, bears, wolves, and even aurochs, he rarely needed anything more lethal than a short sword.

In 1629 Henry Hoppie and Peter English set up a sword manufactory at Hounslow.[53] They and their successors—Benjamin Stone, Richard Hopkins, Johann Kinndt or Kennet, Joseph Jenks, etc.—together with the sword cutlers of London, seem to have concentrated on three main types of swords; rapiers, distinguished by their scroll quillons and elongated, fluted pommels; basket-hilted cavalry swords, known now as 'mortuary' swords; and hangers or cutlasses, with or without a serrated back edge. Hilts of the first two groups are usually of plain iron construction unadorned apart from chiselling of a rudimentary nature. But many of the hangers are decorated with silver encrustation work typical of the English style introduced at the beginning of the seventeenth century. Examples in the Tower of London Armouries, Victoria and Albert Museum, Wallace Collection, and private collections which appear to date to the 1630–50 period have a characteristic flat-bonnet pommel with a scroll peak where the knuckle-bow tang is attached. On some the knuckle-guard is of flattened section with a vase-shaped centre, the short, down-drooping quillon with a similar terminal. The shell-guard is of trefoil shape, sometimes fitted to both sides of the hilt. The larger right-hand section curves slightly downwards, the other, if present, curves upwards. Blades on these hangers are slightly curved, varying in length from 20 to 30 in. They bear a variety of marks not easily identifiable—some can be traced to London cutlers, others to Solingen smiths—but they are often signed and dated with London or Hounslow being given as the address. The grips are of staghorn, occasionally divided in the middle by an iron band, or are of wood bound with iron or silver wire. The Tower of London example (Pl. 14) is a fine specimen, the grip being bound in a chequered pattern of contrasting silver strapwork and the guard being inlaid with a criss-cross pattern of silver dots.[54]

The manufacture of another group of hilts seems to have been confined to the cutlers of Hounslow.[55] These hilts are distinguished by the use of brass lion-headed pommels, the necks extending well down the grips which are of polished, fluted wood. This combination of brass pommels with iron-guards is most unusual and behind it lies an interesting story. At this period two of the city companies of London concerned with the making of iron wares, the Girdlers and the Cutlers, were exercising their rights of control within a small radius of the city, by searching the premises of sword manufacturers and confiscating goods of foreign manufacture. They did this under the powers of the 1563 Statute (see p. 21). But they were facing not only competition from abroad but the introduction of a new method of manufacture—the casting of hilts and accessories in brass. The Girdlers Company, in fact, managed to obtain a Royal Proclamation from Charles I, dated 12 January 1632/3,[56] prohibiting the manufacture of belt hangers and buckles in brass, on the grounds that 'Buckles which are cast in Brasse, are brittle, and not so serviceable as those made of Iron'. The real reason for the iron-workers' fears, as they themselves admitted, was that 'those who cast the brasse Buckles can make more in one day, then ten of those that make the Iron Buckles'.

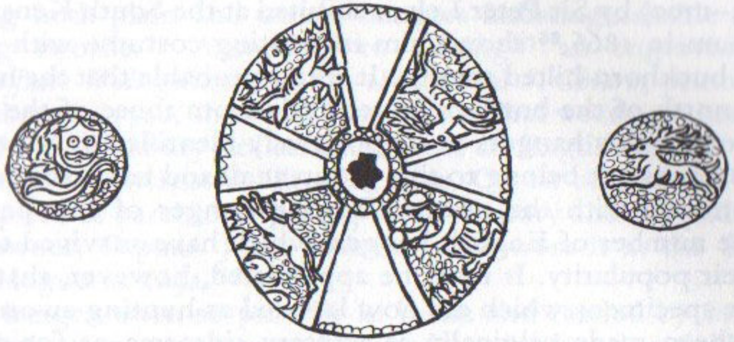
The Cutlers Company, for their part, decided quite arbitrarily that they could exercise similar powers and proceeded to confiscate all sword hilts and parts made of brass. On 24 May 1650 their Court of Assistants reinforced their position by promulgating a ruling that 'all hilts pomells and handles cast in brasse or anything else belongeing to a sword, rapier, dagger, hanger and skeyne are unserviceable, deceiptfull and unlawfull wares'.[57] They did so under the mistaken belief that this was covered by earlier statutes of 5 Hen. IV, c. 13 and 8 Hen. V c. 3. Such was the power of a city company that for some years none dare challenge this assumption, except for the Hounslow makers safely at work on their distant heath.

A greater power than the Cutlers, however, was to enter the dispute. This was the Board of the Ordnance, responsible for the supply of weapons to the British Army and Navy. In the 1670s they gave their first orders to the London cutlers for plug bayonets which had brass pommels and quillons.[58] The Ordnance were concerned only that their arms should be cheap and

serviceable. The brass work was soon found to be both and, by the 1680s, more and more of the military sidearms were being fitted with brass or other soft-metal hilts.[59] One of their main contractors was the London cutler Thomas Hawgood whose premises were repeatedly searched by officials of the Cutlers Company. By 1683 resistance to the Company's attitude had grown to the extent that they were forced to take Counsel's opinion. This made it clear that the old statutes merely prohibited the silvering or gilding of brass with the intent to pass it off as precious metal.[60] With the collapse of the old restrictive ideas the way was now open for the sword cutlers to adopt whichever method of manufacture they preferred.

It is noticeable that although some English hangers with iron hilts can be dated to the last decades of the seventeenth century the majority of those surviving from this period have hilts of brass or silver. Basically they follow the old design with a short, slightly curved blade, staghorn hilt, and a knuckle-bow ending in a down-drooping quillon. The shell-guard, however, is not always fitted and the flat bonnet pommel becomes rounded and loses its scroll peak. The silver hilts are most interesting as many of them bear maker's marks and, more important, London date letters. The maker's mark, IH in a heart (unidentified), is stamped on the author's sword (Pl. 22), on a hanger in the Victoria and Albert Museum (No. M. 100–1913) and on one illustrated by P. Carrington-Peirce in his *Handbook*.[61] Hall-marked hilts are found at the Victoria and Albert Museum (No. M 152–1922) dated 1702/3, at Windsor Castle (No. 132) dated 1697/8, and at the National Maritime Museum, Greenwich (No. 339) dated 1702/3.

The decoration on the silver and brass hilts is interesting. A greater freedom of expression is present on the silver specimens which are both cast and engraved (Pl. 20). On the brass hilts which are nearly all cast with decorative motifs (Fig. 11), a standard series of moulds or patterns seems to have been employed, although not always in the same combination. A shell-guard cast with a classical warrior scene may on one sword be joined to a knuckle-bow with a trophy of arms in the centre. On another sword the same shell-guard will be found with a knuckle-bow embellished with a Roman bust. Favourite subjects for the pommels seem to have been combinations of Tudor roses, fleur-de-lis, cherub, or royal heads. Again, pommels



11. Cast and engraved decoration on the brass pommel and quillon (both sides) of an English hunting hanger, *c.* 1700.

from the same mould are found with different combinations of bows and guards. This interchange of decorative mouldings was not confined to the range of hangers, subjects used on the latter being applied to bayonets, small swords, and military swords.[62]

Amongst the silver-mounted hangers of the late seventeenth century is a small distinct group which have been thought in the past to be of Scottish origin. Hangers were, of course, just as popular in Scotland as in England. They are mentioned in the records of the Hammermen's Incorporations and in other accounts and inventories. It was a hanger that Sir John Ramsey drew to defend James VI against Alexander Methven's attack at St. Johnston. This particular group of hangers have buckhorn grips and quillons capped with plain silver cups.[63] An unusual feature of the swords is the silver sheath at the base of the grip extending down to cover the ricasso (Pls. 18–19). It would be unwise to lay too much emphasis on the supposed nationality of this group as the ascription appears to have originated with the appearance of one of these swords—without apparent justification—in Drummond's *Ancient Scottish Weapons*.[64] A sword of this type in the Victoria and Albert Museum, London (No. M 76–1930), is stamped with a silversmith's mark WS which has been identified in the past with that of an Aberdeen maker. But again there is little justification for this. Other evidence, in fact, suggests that the swords were made and used mainly in England. The blades inserted in many of these distinctive buckhorn hilts have obviously come from the same workshops as those on recognizable English hilts. The portrait of Sir Francis Winnington

(1634–1700) by Sir Peter Lely, exhibited at the South Kensington Museum in 1866,[65] shows him in hunting costume with one of these buckhorn-hilted swords. It seems probable that the hangers used north of the border differed little from those of the south. One of the few hangers to be positively identified as Scottish of *c.* 1680 does not belong to this group at all and has many features in common with the normal English hanger of this period.[66]

The number of English hangers which have survived testifies to their popularity. It must be appreciated, however, that many of the specimens which are now labelled as hunting swords may have been made originally as military sidearms or for civilian defence. As early as 1682 hangers were being issued to gunners of the British Army by the Ordnance.[67] No description was given of these, but, ten years later, the London cutlers Thomas Hawgood and John Hill supplied the Ordnance with the following:

For Gunners	New Scimiters wth Hartshorne Handles Brass shells & Guards wth scabbards & brass Chapes to each . . . @ 5/6*d.*
For Mattrosses	New Hangers wth brass Hilts & Handles wth Scabbards & Brass chapes to each @ 5/6*d.*[68]

The 'scimiters' were probably the same as the hangers previously issued to the gunners. Their description unfortunately fits many so-called hunting swords so that this interesting military sidearm has yet to be identified. The 'new hangers' with all-brass hilts could be of the type which were later referred to as hangers with 'Lyon Heads' or 'Dogs heads' on the hilts, and which were extensively rebladed by the Ordnance cutler Thomas Hollier in the 1720s. Hundreds of them were subsequently used for the decoration of the walls of Windsor Castle, the Tower of London, and Hampton Court. A few of this type of sword were enamelled in blue (Pl. 17), black, or white.[69]

In most European armies the small brass-hilted hanger was adopted first as a sidearm for infantry and then by specialized corps such as pioneers and riflemen, the latter's being adapted to fit as a bayonet. Hangers of suitably superior quality were also worn by many military and naval officers. Portraits painted by Michael Dahl and Sir Godfrey Kneller now in the National Maritime Museum, Greenwich, show a number of naval officers

carrying both plain and ornate hangers indistinguishable from hunting swords.[70] According to Laking[71] an engraving in *Neu-eröffnete Welt-gallerie von P. Abrahams à S. Chiara*, printed in Nuremberg in 1702, shows an English admiral wearing a hanger. In the John Winsbury Collection there is an English hanger with an iron, silver-encrusted hilt of *c.* 1640. On its scabbard is fastened a piece of parchment giving its full history and the pedigree of its owner, Captain John Jackson, who wore it at the Battle of La Hogue in 1692.[72]

The hanger worn so proudly in battle and carried by men of such distinction, was regrettably used on the hunting field in a custom which seems distasteful to us today. After the stag had been killed, certain ceremonies were observed. The young hounds were given a taste of the blood in order, as Richard Blome wrote in his *Gentlemans Recreation* in 1686, 'to make them in love with a Deer'. Blome then described the rest of the ceremony:

the *Huntsman* presents the Person that took the *Essay* with a drawn *Hanger*, to have a Chop at his *Head*, and after him, every one hath a Chop if it is not cut off; and generally the *Huntsman*, or *Keeper* is provided with such a *Hanger*, that is not over Sharp, that there may be the more Chops for the gaining more *Fees*, every one giving him a Shilling at least.[73]

This appears to have been a peculiarly English custom for Fouilloux does not mention it in his *La Vénerie* (1573), but George Turberville, whose book *The Noble Arte of Venerie* (1575) is mainly a translation of Fouilloux, mentions the ceremony in one of the few original passages: 'they take delight to cut off his head with their woodknives, skaynes or swords, to try their edge and the goodness or strength of their arm'.

In an age less fastidious in many ways than our own there were still some voices raised in protest against these practises. One commentator, listing the follies of his fellow men, ranked amongst them:

such as take an immoderate Delight in *Hunting* and think no Musick comparable to the Sounding of Horns and the Yelping of Beagles; and were they to take Physick, would no question think the most Sovereign Virtues to be in the Album Graecum of a Dog's Turd. When they have run down their Game, what strange Pleasure they take in cutting of it up! Cows and Sheep may be slaughter'd by common *Butchers*, but what is kill'd in Hunting must be broke up by none under

a Gentleman, who shall throw down his Hat, fall devoutly on his Knees, and drawing out a slashing Hanger (for a common Knife is not good enough) after several Ceremonies shall dissect all the Parts as artificially as the best-skilled Anatomist, while all stand round shall look very intently, and seem to be mightily surpriz'd with the Novelty, tho' they have seen the same an Hundred times before; and he that can but dip his Finger, and taste of the Blood, shall think his own better'd by it;[74]
These sentiments were not shared by many. Hunting was the national pastime enjoyed with great gusto in most countries.

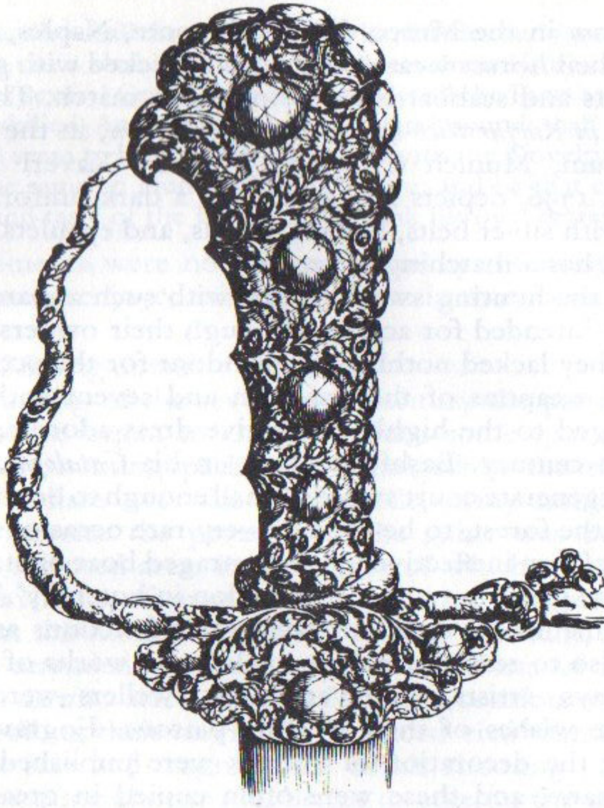
Ornamental Hunting Swords

At the beginning of the seventeenth century the pattern of the hunt in Europe began to change. Whilst some sportsmen still retained their hunting packs and indulged in the rough and tumble of a chase over the countryside, many noblemen had decided to reverse the procedure. The game was beaten and driven into enclosed areas in the centre of which were shooting stands or pavilions, often of fantastic construction (see Chap. 6). Secure from the normal toils and perils of the hunt, the noble sportsmen, attended by their ladies and cohorts of followers, could shoot down a wide variety of game in comfort without the tedium of soiling their hands. As each lord vied with his neighbour in the size and magnificence of his shooting parties, the hunt, always a social occasion, began to take on the appearance of a durbar. By the beginning of the eighteenth century it was common practice for special uniforms rivalling the most elaborate of military designs to be worn by the hunt servants of each class, the professional huntsmen and the members and guests of both sexes.

The oil paintings of Johann Heinrich Tischbein (1722–89), commissioned by the Landgrave Friedrich II of Hesse-Kassel, show in detail the splendid red dresses and suits lined with blue silk and trimmed with fine brocade and gold lace worn by the members of the Landgrave's hunt.[75] Their swords and other accessories seem little more than tinsel trappings. The *Jagdgarnitur* of Josef II, *c.* 1765, now in the Kunsthistorisches Museum, Vienna, includes an ivory and gilt-handled hanger suspended from a green leather sling edged with gold lace. An ivory hunting horn on a similarly decorated sling accompanies it. In the oil painting, dated 1785, of the boar hunt of Ferdinand IV of Naples, now in the Museo di Capodimonte, Naples, the huntsmen and their horses wear green cloth bedecked with gold. Their sword belts and scabbards are coloured to match. The portrait, *Ein Mann in Kurfürstlich-bayerischer Jagduniform*, in the Deutsches Jagdmuseum, Munich (No. 5043), by F. Xaveri Aerrmann, painted in 1796, depicts a huntsman in a dark uniform liberally covered with silver belts, badges, braids, and epaulets. His hunting sword has a matching silver hilt.[76]

Few of the hunting swords worn with such apparel can ever have been intended for action, although their owners made certain that they lacked nothing in splendour for the occasion. The functional weapons of the sixteenth and seventeenth centuries thus changed to the highly decorative dress adornments of the eighteenth century. Bashford Dean, in his *Catalogue*, dismissed them as degenerate court swords 'small enough to be conveniently carried in the forest, to be used on very rare occasions to defend the wearer [very ineffectively] from enraged boar or stag, daintily to bleed the game but never to function in butchery'.[77] This is a fair assessment but, in discounting their functions as weapons, one has also to remember their qualities as works of art.

As always, artists, engravers, and jewellers were ready to inspire the wishes of their wealthy patrons. Engraved pattern books for the decoration of swords were published in France and Germany, and these were often copied in great detail by cutlers all over Europe. An example of this alliance between artist and armourer can be seen in the hunting sword at Windsor Castle (No. 867) which, together with a pair of pistols and a fowling piece by Michele Battista of Naples, formed a hunting garniture of Charles III of Spain. The sword, which was mounted in Naples by the Viennese Frantz Bourgeois in *c.* 1775, has a chiselled-steel and gilt hilt. The decoration is composed of a number of small motifs—military and hunting trophies—all of which can be traced to the patterns designed and published by the French artists De Lacollombe, De Marteau, and Christophe Hüet between 1730 and 1750.[78] The task of forging and chiselling some of the more extravagant designs in iron was exceedingly difficult and more often than not they were cast in silver or bronze to be chased, engraved, gilded, and perhaps set with stones (Fig. 12). Thus goldsmiths and jewellers often became more involved than the swordsmith.



12. Design for a jewelled hanger by Friedrich Jacob Morison, 1697.

One of the foremost designers and manufacturers of fine quality hunting swords and accessories was Johann Melchior Dinglinger (*c.* 1690–1731)[79] who worked in Dresden with his brothers Georg Friedrich and Georg Christoph, and was later joined by his sons Johann Friedrich and Moritz Conrad. He directed a family group talented in the use of precious metals, stones, and enamels. For his patron August the Strong he made handsome, if frivolous, garnitures of hunting weapons and accessories. The Karneol-Garniture now in the Green Vaults, Dresden, consists of a hanger, knife, walking stick, whip, fob, plumes, aigrettes, and sets of buttons and buckles all mounted with cornelians and precious metals. Dinglinger also designed and produced a great *Jagdservice*, the complete lay-out for a hunting feast—cutlery, food vessels, table ornaments, etc. There was a Silver Garniture,

and other garnitures were set with sapphires, emeralds, and agates. The Great Diamond Garniture included a sword which could have lacerated the hand if held without a glove. In the same category of impracticable hunting swords are the two swords with gilt hilts covered with pearls made in *c.* 1720 for King Frederick IV of Denmark and his brother Prince Carl.[80]

In examining the great wealth of eighteenth-century hunting swords it is easiest to divide them into groups according to the main material of their hilts. The untreated staghorn or buckhorn which made such a sensible and appropriate grip for the sixteenth- and seventeenth-century sword was now largely discarded. In the Musée de l'Armée, Paris, is a German hanger (No. M. A 5992) of *c.* 1775 which illustrates to what extent even staghorn could be treated to produce an extravaganza of a hilt. The grip is carved with the head of a scaly monster from whose gullet issues the twin tails of a serpent. Practically every conceivable substance of animal, vegetable, or mineral origin that could be worked into a handle was brought into use; ivory, agate, glass, china, shell, jade, ebony, etc. The first named, ivory, had been popular from an early date,[81] but came into prominence at the beginning of the seventeenth century. The cutlers of London were amongst those excelling in the manufacture of table knives and forks with carved ivory handles. The 1633 edition of Stow's *Survey of London* boasts—perhaps not without reason—'in King James the First's time, the best and finest Knives in the world were made in London'. But nearly all the large manufacturing centres in Europe, particularly in Holland and Saxony, had their quota of ivory turners and carvers. One of the most important centres of the ivory trade was at Dieppe. The historian Masseville, in his *Histoire sommaire de Normandie* (1688–1702), wrote: '*Les Dieppois de surpasser toutes les autres villes du monde pour la délicatesse des ouvrages d'ivoire.*'

The seventeenth-century form of ivory hilt often copied the so-called Scottish buckhorn hilt (see p. 27) in that it was constructed of two pieces of the material, one forming the grip and the other the quillons. The ivory hilts are, however, elaborately carved with dogs attacking hares, stags, bears, and lions, the bodies inextricably mixed up in a seething column (Pl. 31). A similar technique was used for a group of circular powder flasks which must have been made *en suite* with these

swords and the appropriate firearm. Fine examples of early Saxon ivory-hilted swords are in the Metropolitan Museum, New York (No. 14.25.1149) and the Victoria and Albert Museum (No. 590–1872). The carving on eighteenth-century ivory hilts is, if anything, of a more delicate quality. The ivory quillons, which must have been susceptible to fracture, are often replaced by metal ones (Pl. 31). The same scenes of battling animals are reproduced, but, on some hilts, eighteenth-century taste has impressed itself with columns of baroque or rococo designs. On the simpler, workmanlike forms of hilt, plates of plain ivory, horn, or bone were riveted to the tang as grips (Pl. 34).

Other materials which lent themselves readily to the sculptor's art were horn and wood. A most unusual rhinoceros-horn hilt is fitted to the sword made for Christian V of Denmark, before his accession in 1670 (Pl. 24). This was inspired by the ivory animal hilts and was probably made by the ivory turner Jakob Jensen Nordmand, who looked after the King's Armoury at Rosenborg Castle. Rhinoceros horn is not often found on European swords but it was a much valued material in Africa and the East as it was thought to possess unusual properties. It was considered to be a potent aphrodisiac and a guide to the presence of poison—hence the popularity of horn drinking cups. Ko Hung, the famous Taoist adept of the fourth century A.D., gave his opinion that 'when a man, hurt by a poisonous arrow, is on the verge of dying and his wound is slightly touched with a rhinoceros horn, foam will come forth from the wound and he will feel relief'. In the Imperial Repository at Tokyo are preserved *tosu* (belt knives) with horn handles or scabbards.[82] The handles of the great curved Abyssinian swords are sometimes made from rhinoceros horn as well.

Horn from other animals, however, was often used on European swords although rarely carved. The hunting sword of Queen Sophia Amelia at Rosenborg (No. 28), made in *c.* 1650, has the most magnificent hilt of enamelled gold but the grip is of plain, polished horn. At Rosenborg also is a fine silver-mounted hanger with an ebony grip presented to the young Christian VII on a visit to France in 1768 by Louis XV. Wooden hilts usually consist of two plates rivetted or framed to the tang and are rarely carved. The silver-mounted hanger at Windsor Castle (No. 294), bearing London hallmarks for 1809, has a grip made

of two plaques of ebony joined by silver-headed rivets. This sword, Laking's *Catalogue* notes, was worn by 'Mr. Du Pasquier when Riding Post with the Prince of Wales'. In the Metropolitan Museum, New York, however, there is a sword (No. 26.145.257) with a grip of intricately carved walnut.

All these materials although easily worked were also susceptible to wear and fracture. There were many cutlers, therefore, who preferred the hardiest of available substances, the chalcedonies or agates. In the seventeenth and eighteenth centuries most of the cut stone came from the mines of Idar-Oberstein in Germany and many swords with grips made from this mineral are for this reason ascribed to German manufacture. But craftsmen capable of grinding and polishing the stone for knife and sword handles settled in many other countries. In Denmark the artist, craftsman, and goldsmith Caspar Herbach was granted a licence, in 1662, to operate a mill with a stone-polishing shop at Lyngby. At a later date Bendix Grodtschilling, steward of the Kunstkammer at Rosenborg, supplied agate hilts for rapiers and hunting swords.[83] In the 1720s an agate polishing mill was established at Frederiksvaert under the control of Michel Becker who probably made the gold-mounted agate hunting sword for Frederik IV.

In London, from the seventeenth century onwards, stone polishers were at work supplying the needs of cutlers.[84] The manufacture of agate handles for cutlery was one of their specialities, judging from the number of surviving specimens. Swords, especially the hangers, were similarly hilted. The majority are silver mounted and bear London date letters (Pl. 27). An advertisement in the *London Gazette* for 10–14 July 1690 (No. 2574), read:

> Left in a Hackney-Coach . . . a new Silver Sword with an Aggit Handle, and a Coningsmark Blade, the Hilt marked with R.H. and a Hood on it.

Few of the agate-handled hangers have large pommels and in the case of the small hunting sword in the Wallace Collection (No. A 706) the tang of the blade is not even riveted through the stone but stuck in a hole partly bored through it. This suggestion of Oriental workmanship is heightened by the silver-gilt bands, set with turquoises and rubies, which encircle the grip and

quillons. Indian and Persian hilts of jadeite or nephrite were, in fact, sometimes fitted with European hanger blades and there are some fine examples in the Kremlin, Moscow. In the Schatzkammer, Munich (No. 694), a French hanger, of *c.* 1740, has a nephrite handle and guard which has been inlaid with gold and silver and set with diamonds. It is accompanied with a gold-braided belt and frog which are also ornamented with silver figures and clusters of diamonds.

Some of the most decorative hunting swords had handles of porcelain, painted with suitable scenes of animal and country life. The grip of the French silver-mounted hanger of 1778 in the Metropolitan Museum, New York (Pl. 33), is decorated with charming vignettes of a sportsman with dogs and ladies. It is typical of the work turned out by the Chantilly and St. Cloud factories in France. As one would expect, the Meissen factory at Dresden was responsible for some of the most ambitious of sword hilts of this class. On the hanger, of *c.* 1750, in the Tøjhusmuseum, Copenhagen, the handle has been made to imitate an animal's hoof. The handles of the accompanying knife and fork are also of porcelain. The Bow factory in London was producing a large quantity of porcelain handles for cutlers in the middle of the eighteenth century, but there is no evidence that they produced handles for swords. By this date they were meeting considerable opposition in this field by the much stronger products of the South Staffordshire enamellers working on copper bases. The great demand in Germany for decorative hunting swords and accessories was met by the Berlin enamelling factories who often supplied the piece in the white so that a local *Hausmaler* could paint the decoration according to the wishes of local clients. One of the finest specimens of this kind is the hanger in the Victoria and Albert Museum (No. C 54–D–1953), which is complete with its shagreen scabbard and leather belt and frog. The latter are covered with enamelled copper placques painted with pictures of huntsmen and game of all kinds (Pl. 32).

Towards the end of the seventeenth century tortoise-shell—obtained from the hawksbill turtle native to Asian tropical waters—began to be imported into Europe. The chief advantage of this malleable material was the ease with which it could be shaped, moulded, impressed, or inlaid with decoration. *Piqué* work, in which the design was inlaid in strips or pinpoints of silver or gold, became a feature of tortoise-shell snuff boxes and jewellery. Its application to swords and guns, however, was uncommon.[85] Two very fine specimens of hunting swords are known. The first, in the Metropolitan Museum, New York (No. 26.145.262), is silver mounted and the shell-guard is chiselled with a hunting scene (Pl. 29). The tortoise-shell-veneered handle is inlaid and *piqué* with silver designs of the kind often found on German snuff boxes of the middle of the eighteenth century. Tortoise-shell work which is decorated with a profusion of scrolls and diaper-filled panels is usually attributed to Naples where such manufacture was a tourist attraction of the eighteenth century. In 1722 a magnificent flint-lock sporting gun was made for the Emperor Charles VI. Although the barrel and lock are signed by the Madrid court gunmaker Diego Ventura, the stock is covered with tortoise-shell, inlaid with gold and set with cameos, probably by a Neopolitan goldsmith and jeweller.[86] With this gun, now in the Kunsthistorisches Museum, Vienna, and probably made to match in *c.* 1740, is a hanger mounted with brass gilt, the tortoise-shell handle inlaid with red gold (Pl. 28).

On the last three types of hilts the bow, guard, pommel, and quillons were intended to act as a decorative frame to the ornamental centre piece, the handle. When the hilt was an all-metal one, however, it could be designed as one decorative unit, and the majority of eighteenth-century cutler's patterns are based on this assumption.[87] In 1727 the Augsburg artist, Johann Jakob Baumgartner, published a set of engraved plates entitled *Eine Gantz Neue Invention von Hirschfaenger und Degengefaess.* His designs, ideally suited for the goldsmith and silversmith, consisted of intricate patterns of strapwork and foliage enclosing vignettes of classical busts and hunting scenes. An early exponent of the rococo style was the French engraver Juste Auréle Meissonier (1693–1750), whose large series of sheets of ornament included one for a golden sword in honour of his King's marriage. More easily adaptable to the casting and chasing process were the designs of Jeremias Wacksmuth (1712–79), another Augsburg craftsman. They are composed entirely of shell scrollwork, twisted and spiralled in assymetrical composition. A number of bronze gilt, ormulu, or silver hunting swords were made in

France based on Wacksmuth's patterns, many with rather large pommels and shell-guards.

A particularly flamboyant example of this rococo style is the hanger in the Nationalmuseum, Munich (No. 13/1150), which belongs to an exclusive group of swords having a watch concealed in or attached to their hilts. On the brass-gilt hilt of this sword the watch, signed BEÑO HUEBER 1619 WIENN is set in the middle of the guard (Pl. 36). The silver-hilted hanger in the Metropolitan Museum, New York (No. 26. 145. 264), is fluted *en torsade* in a plain but distinguished manner. German and Dutch silversmiths tended to follow the other Augsburg school of more involved rococo patterns. The English silversmiths favoured two particular patterns of hilts. The first resulted in a heavy, cast-silver hilt with a large shell-guard (Pl. 26). The curve of the bow and that of the combined pommel and backstrap meet to form an oval. The centre of the bow, the pommel end of the strap and the guard are usually cast with a gargoyle's head or grotesque mask in deep relief. The handle is nearly always of fluted horn. These swords bear hallmarks of the second quarter of the eighteenth century. The second type of hanger is of much lighter construction. Two small quillons, perforated with spirals of closely coiled tendrils are joined by a chain to the pommel, which is shaped with the head of a lion or dog. The handle is often of ivory, stained green. Dating mainly to the second half of the century, they found favour not only with huntsmen but with military and naval officers.

On the Continent hunting swords were made with a great variety of cast-bronze hilts; some very plain with a simple shell-guard, others with the pommel and quillons fashioned as animals' hooves or cast with complicated figure-moulding on the bow, and a hunting scene on the guard. An accompanying knife and fork in the scabbard were standard parts. In this series of cast hilts there is one very distinctive group. Although of European form they are decorated in the Chinese manner but are made of the Japanese copper and gold alloy *shakudo*. They were at one time considered to have been made in Tonquin, a province of Annam under Chinese influence, but no evidence was ever adduced to support this theory. Other objects, stick-handles, tobacco boxes, etc., made in this way, sometimes bear figures in Japanese costume, and the alloy itself appears to be an exclusive

13. Detail from the engraving *Die parforce Jagd des Hirschen* by J. E. Ridinger (1698–1747). The huntsman wears a typical hanger of the period.

Japanese production. There seems little doubt, therefore, that these hilts were made under Japanese direction for export to the European market. There is some indication, in fact, that they were made for the Dutch East India Company at their factory at Deshima in Japan.

Three of the finest examples are the hangers in the Metropolitan Museum, New York. On all of them the decoration of landscapes and hunting scenes is chiselled in relief on a gilt-stippled background. One sword has a handle of lucky 'dragon's tooth' mammoth ivory. This is complete with a white shagreen scabbard. Another shakudo hanger in the Victoria and Albert Museum also retains its shagreen scabbard (Pl. 16). In the Dresden Armoury is a garniture of hanger, dagger, and walking stick all with mounts of shakudo, and it is interesting to note that the hanger, which is very similar to one of the New York examples

(No. 26.145.260), was described in a Dresden inventory of 1716 as *'ein Moscowitisches Kleines Seiten Sebelgen'*.[88] Another example of this group of swords, in the Kunsthistorisches Museum, Vienna (No. A 2341), has a blade etched with the inscription:

AMOUR EST DOUX ET NON AMER
QUAND EST SUWY DE CONTR'AYMER

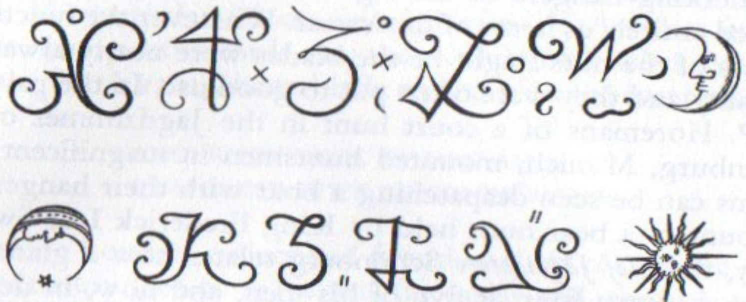
As some London cutlers had found to their cost in the seventeenth century (see p. 25) it was far easier and cheaper to cast an intricate design in brass and silver than to attempt to chisel it out of iron or steel. The number of fine-quality iron-hilted hunting swords made in the eighteenth century does not compare with those made of the softer metals. The hangers with the shakudo hilts, were, in effect, cheap imitations of the iron hilts chiselled in relief with gilt backgrounds turned out by the great iron sculptors of such centres as Tula in Russia. They applied their craft to the production of household pieces like candlesticks and tables as well as to the more personal items of tobacco boxes and swords.[89] Another centre was Carlsbad. A visitor in 1768, wrote of the 'sword cutlers on the Wiese, who make the fine gold inlaid work on hunting swords, stick-handles, and all kinds of work-holders for ladies. . . . It is a pleasure to visit the large number of artists in pewter, steel and iron who live on the Wiese and to observe how the Carlsbad masters not only equal the most skilled English but often outdo them.'[90]

Skilled the English cutlers might be, but few fine, steel-mounted hunting swords of the second half of the eighteenth century have come down to us. Amongst the manufacturing centres of France and Germany, however, a fairly standard pattern of hilts developed. The handle was of flat pistol form, or was cylindrical, widening at the pommel. The quillons were short, stubby and both were down-drooping. Steel hilts of this kind were often blued and gilt, with a few portrait medallions or decorative ovals breaking up the applied overall geometrical pattern (Pl. 35). A spiral arrangement of metal strips to the grip was also popular. The hunting sword given by King Ferdinand of Naples to Gustav III of Sweden in 1784 now in the Livrustkammar, Stockholm is an outstanding example of this group.

The hunting hangers of the eighteenth century must not be dismissed entirely as items of dresswear. Whatever the functional weakness of the hilts might be the blades were nearly always of fine quality and they were often put to good use. In the painting by J. P. Horemans of a court hunt in the Jagdzimmer of the Amalienburg, Munich, mounted huntsmen in magnificent blue uniforms can be seen despatching a boar with their hangers. In an account of a bear hunt held by King Frederick I of Sweden in 1737, the *Hof-Jägmästere* Schönberg relates how a giant bear had struck down four or five of his men, and how, in despair, 'the King ordered that all the dogs which amounted to about sixty, should be let loose upon him, which was accordingly done, when he at once killed six or seven of them; but he was afterwards mastered by the others, so that I was enabled to give him a couple of thrusts through the body with my hanger, which, together with his life, put an end to all his fire and ferocity.'[91] The huntsman needed a stout blade as well as a stout heart for this sort of encounter.

Hunting Blades

By the beginning of the eighteenth century the swordsmiths of Solingen established almost a monopoly for the supply of blades to the hilt-makers of Europe. They made them in every form and size to suit the wishes of the customers.[92] The blades of hangers varied in length from 18 in. to 30 in. Some were straight, others were curved, but rarely approached the sweep of a sabre. The majority were back-edged, the more serviceable ones with a serrated edge. The number, depth, and length of the fullers or grooves on the blade vary from sword to sword. The blade-makers still impressed their own marks or names, but many fictitious signatures are found, and it is obvious that, if necessary, they stamped on the blades the kind of mark the customer liked best. Certain marks, the running wolf for instance, were regarded in many countries as a guarantee of the quality of the blade. But in fighting and in hunting the swordsman often needed more than confidence in his blade. It had to possess some mystical quality to spur him on to greater deeds or to bring him luck. On many hunting sword blades, therefore, magical signs or numbers are engraved for this purpose (Fig. 14). Some can be identified as standard astrological symbols. One set has been construed as



14. Magical signs engraved on the blade of a German eighteenth-century hanger.

'a talisman to make one beloved, to defeat the ill wishes of all enemies'.[93] Others have a cabbalistic meaning known only to the original owner or the magician who sold him the spell. The number 1414 which is often stamped on seventeenth- and eighteenth-century blades has been variously interpreted as a combination of the lucky number seven or the date of the death of the Bohemian hero Johann Huss.[94] Unfortunately other sets of numbers such as 1441, 1506, and 1515, were also used and there is, as yet, no logical explanation for them.

Most of these magical signs appear on hunting swords which originated in Germany or which were used in Germany. Hunting blades are usually distinguished, as one would expect, by the etching of a hunting scene and a suitable motto. In the second half of the eighteenth century decoration on the blades was often confined to a band of interlaced strapwork with some sprays of foliage or martial trophies. In the Victoria and Albert Museum is a pattern book (No. 93 D3) apparently the work of an English artist, Robert Wilson, of *c.* 1760–90. This contains some hundreds of designs for blades. By this period the practise seems to have been fairly universal for the sword cutler, or in effect, the hilter to order the blades in the white from one of the recognized centres of the blade-making industry like Solingen, Klingenthal, Birmingham, etc. and to finish it himself. French and German cutlers normally put their names on the blades when etching the decoration, but English cutlers engraved them on the back of the top locket of the sheath.

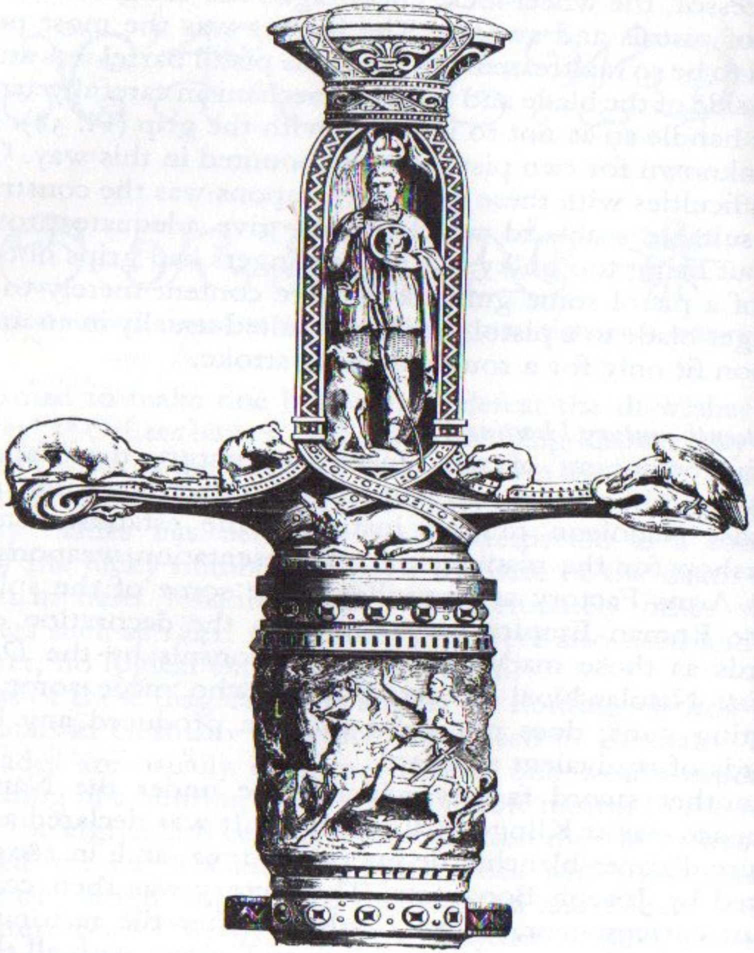
The eighteenth century saw the predominance of the flint-lock firearm and the small size of the flint-lock pistol compared to its

predecessor, the wheel-lock, encouraged the design of combinations of pistols and swords. The hanger was the most popular sword to be so maltreated. On some the pistol barrel was attached to the side of the blade and the lock mechanism carefully arranged in the handle so as not to interfere with the grip (Pl. 38). It was not unknown for two pistols to be mounted in this way. One of the difficulties with these multiple weapons was the construction of a suitable scabbard which would give adequate protection without being too bulky. As many hangers had grips not unlike that of a pistol some gunmakers were content merely to fasten a hanger blade to a pistol, but this resulted usually in an ungainly weapon fit only for a rough slashing stroke.

Nineteenth-century Hunting Swords

At the beginning of the nineteenth century the Napoleonic Wars brought a temporary halt to the production of fine hunting swords. Napoleon himself instituted the establishment of a workshop for the manufacture of presentation weapons at the State Arms Factory at Versailles. Here some of the splendour of the Roman Empire was revived in the decoration of such swords as those made for the three consuls by the *Directeur-Artiste* Nicolas-Noël Boutet. Boutet, who made some superb sporting guns, does not seem to have produced any hunting swords of equivalent standard.

Another sword factory which came under the Napoleonic influence was at Klingenthal in Alsace. It was declared a 'Manufacture d'armes blanches de guerre' in 1792, and, in 1805, it was visited by Joseph Bonaparte. The factory was then controlled by an entrepreneur, Julien Coulaux. After the restoration the Coulaux family formed a company and, along with all the other manufacturers of Europe, began to take up once more the production of fine sporting swords. They reintroduced the staghorn hilts, cutting smooth plaques in the natural rough surface on which were carved, in low relief, hunting scenes with the background stained so that the figures stand out with admirable clarity. They also brought back the old seventeenth-century type of quillon made of horn and carved with animals.[95] The firm of Weyersberg of Solingen also made this type of hilt. German and French firms in fact seem to have made a point of reviving nearly all the old styles of manufacture for their hunting swords. The sword in



15. Hilt of a ceremonial hunting sword by Marrel, Paris. Exhibited at the Great Exhibition, London, 1851 (now *Victoria & Albert Museum* (No. 159–1851).

the Wallace Collection (No. A 705), for instance, has a hilt of chiselled steel which may be a genuine product of the eighteenth century. The ivory scabbard is carved in relief with an intricate composition copying the old Saxon theme of hounds bringing down wild animals, and the blade is etched with eighteenth-century motifs, but both forms of decoration are unmistakably of nineteenth-century execution. The scabbard may well be the

work of one of the Dieppe families of ivory carvers who still continued with their traditional craft and specialized in reproducing the styles of the sixteenth and seventeenth centuries.[96]

When it came to the designing of special swords for presentation or exhibitions the sword cutlers flung aside all inhibitions. On the French hunting sword presented by Napoleon III to the Marquis of Hertford in *c.* 1860, now in the Wallace Collection (No. A 707), the hilt is cast in silver as a sculpture of an American Indian struggling with a mountain lion, while a second lion lies at his feet pierced by an arrow. The scabbard is of oxydized silver *en suite* with the hilt. The International Exhibitions held in London, Paris, and Berlin in the second half of the nineteenth century were enlivened by such Victorian fantasia. At the 1851 London Exhibition the silver hunting sword by Marrel Frères of Paris, with its hilt cast and chiselled with subjects from the legend of St. Hubert and other attributes of the chase, attracted admiration and was bought for permanent display for the sum of £200 (Fig. 15).[97] It was not only in the artistic field that the Victorian sword cutlers allowed their imaginations to run free. The extremely small percussion and early cartridge pistols, which were available, gave every encouragement to inventors to produce a weird assortment of combination swords and firearms. Most of these were directed towards the military market, but the hunting hanger was subjected to various degrees of modification of this sort and, in 1840, Joseph-Célestin Dumonthier of Paris took out a French patent (No. 11875) for '*couteaux de chasse pistolets*'. The patent taken out in England by W. Davis, in 1877, was for a sword fitted with a revolver taking the Boxer cartridge, the scabbard being hinged in two places to fold into a gun stock.

Modern Hunting Swords

The introduction of mass production methods did not effect the sword factories as much as those of other industries. They still called on the old traditional skills to effect individual patterns, and the catalogues of such firms as Carl Eickhorn of Solingen illustrate a wide range of hunting swords available to the general public. There were two basic groups; those with knuckle-bows and those without. The style of decoration varied according to the German state preferred—Bavaria, Saxony,

Hesse, Brunswick—and there were different qualities or finishes available to satisfy rank or purse. Eickhorn's 1908 model *Braunschweigisches Gala-Hirschfänger*, it may be noted, bore a strong resemblance to the English seventeenth-century hanger (Fig. 16).

16. Hunting swords from the 1908 Catalogue of Carl Eickhorn, Solingen. *Left to right*: Saxon *Hirschfänger*; Saxon *Oberförster-Hirschfänger*; Brunswick *Gala-Hirschfänger*.

The advent of the Nazi party to power in Germany brought with it a great stimulus to the wearing of ceremonial swords and daggers, and the swordsmiths of the Solingen district thrived. Hunting swords and daggers were brought into prominence because of Hermann Goering's great interest in hunting. Amongst many other titles he held the rank of *Reichsjägermeister*. Both the National Forestry Service (*Reichsforstamt*) and National Hunting Association (*Reichsbund Deutsche Jägerschaft*) were under

his control, and it was he who conceived the idea of the great International Hunting Exhibition held in Berlin in 1937. A natural exhibitionist and lover of ornate wear, he designed many of the ceremonial weapons worn by the members of both associations.

The main differences between the swords of the two organizations was that those of the Forestry's officials had knuckle-bows whereas the standard swords of the Hunters had small quillons only, formed as animals' hooves. The hilts of the standard Forestry weapons bore three acorn rivets and the national eagle and swastika badge, the mounts being given a gold-coloured finish. The scabbards were of black leather. The hilts of the Hunters' swords bore only the Society's emblem of a silver stag's head with a swastika. The mounts were given a matching silver finish and the colour of the scabbard was green. Senior members of both organizations were distinguished by grips of ivory or white plastic, instead of the standard grips of staghorn. Each manufacturer, however, introduced slight variations in the patterns; there were many special presentation swords and semi-official models. All the blades were etched with similar hunting scenes. The only mandatory requirement, in fact, was that the right kind of grip, ivory or staghorn, should be purchased to accord with one's rank.[98]

It is doubtful whether such an array of hunting swords will ever be assembled again, but the Solingen smiths continue with their trade and it is in Germany today that the majority of hunting swords are still being made.

Oriental Swords

No mention has been made of Oriental swords because no swords were designed in the East solely for the hunt. Japanese prints of boar and deer hunts show the hunters wearing the traditional samurai sword. The chopping swords or jungle knives, the *dao* of the Nagas of Assam, and the *parang* of the Malays, used in hunting, were all general purpose swords. The sword seen almost exclusively in Indian and Persian illustrations of the hunt is the curved *talwar* or *shamshir*, the most common of Eastern swords. The blades of some of these are decorated with animal or hunting scenes and have been named as hunting swords, *shamshir shikargar*, but nothing else distinguishes them

from the rest. The great pride of the Eastern swordsmiths was the quality of their blades. Judging from Indian and Persian paintings, hunters wielded them with great effect, leaning from their saddles to deliver great slashing blows which almost cut an animal in two. The painting of Umed Singh, Raja of Bundi, N. India (1749–*c.*1773) in the Victoria and Albert Museum (I.S. 554–1952) shows him on horseback slicing the throat of a giant boar with his *talwar*, having unsuccessfully attacked it with bow and arrows. Another Bundi painting of *c.* 1820 depicts a huntress, a lady of the court, striking down a tiger with a wide-bladed *talwar*.[99] An English officer in India in 1840 noted:

> The Sikhs have a curious way of catching the wild hog, which I never saw practised in any other part of India. They make a kind of snare of strong withys, and setting them in runs of the hogs generally succeed in catching the finest boars, who when once disturbed, rush blindly on, till brought up by these snares, when a man goes up, and generally at a single blow of his sword puts an end to them.[100]

European blades were often fitted to Eastern hilts and there was a considerable trade between the Solingen smiths and the African markets.[101] The Rev. J. G. Wood had this to say on the sword of the Hamran Arabs:

> It is straight, double-edged, and is furnished with a cross-handle, like that of the ancient Crusaders, from whom the fashion seems to have been borrowed. The blades are of European make, and the Arabs are excellent judges of steel, valuing a good blade above everything. They keep both edges literally as sharp as razors, and prove the fact by shaving with them. . . . The length of the blade is three feet, and the handle is about six inches long, so that the weapon is a very weighty one, and a fair blow from its keen edge will cut a man in two. . . . Armed with merely a sword, these mighty hunters attack all kinds of game, and match themselves with equal coolness against the elephant, the rhinoceros, the giraffe, the lion, or the antelope.[102]

The elephant was hunted by two mounted hunters, one acting as a decoy galloping just in front, whilst the other attacked from the rear cutting through the hind feet of the animal leaving it helpless.

During a hunt in Abyssinia with these Arabs, Sir Samuel Baker borrowed a silver-mounted family sword from his head man, Taher Noor, who cautioned him against striking a stone

with it. Suddenly attacked by a young rhinoceros Baker 'delivered a lightning-like downward cut with Taher Noor's favourite sword. The young rhinoceros fell stone-dead, all in a heap. The Arabs ran to the spot. Taher Noor took the sword carefully from my hand, and pointing it at arms length, he looked along the edge; he then wiped the blade upon the body of the rhinceros, and, to prove the perfection of his weapon, he shaved a few hairs off his naked arm; then exclaimed with a deep sigh of pleasure and astonishment, "*Mashallah*", and returned it to the scabbard.' Baker found that the sword had cut between two of the vertebrae nearly severing the fifteen-inch thick neck, the head being held only by the thick skin of the throat.[103]

Chapter Two

Knives and Bayonets

An intriguing feature of many Cretan bronze daggers of the seventeenth and sixteenth centuries B.C. is the hunting scene engraved on or picked out in gold and silver intarsia work on the blade. Not much significance can be attached to this however. The famous blade decorated with a lion hunt found at Mycenae (Shaft Grave IV), now in the National Museum, Athens, probably came from a ceremonial dagger and whilst the plain bronze dagger undoubtedly formed part of the Minoan hunter's equipment it was a defensive thrusting weapon suitable for sport or war. No knife or dagger specially designed for the hunt seems to have been evolved in prehistoric or classical times.

The Scramasax

The ancestor of the hunting knife of the Middle Ages and indeed that of today was the *scramasax*, the all-purpose knife of northern Europe, which was in use at least by the eighth century A.D. Its stout, single-edged blade, triangular in cross section, could thrust and cut equally well; it could defend its owner against man or beast, could skin and joint game, or cut wood; and it could be used as an eating knife if necessary. It had a blunt back which usually ran parallel to the edge until it neared the point where it dipped to meet it in a concave or straight line. The blades varied in length from a few inches up to the dimensions of a short sword, the finer specimens being inlaid with runic inscriptions or geometric designs. An example of the smaller-size blade of *c.* A.D. 900–1000 in the British Museum (No. 81.6–23.1) is inscribed with the name of the maker BIORHTELM and the owner SIGEBEREHT.[1] With its slanted point and brass and silver inlay it is strangely like the *piha-keetta*, the

Sinhalese dagger-knife of the seventeenth and eighteenth centuries. The pointed tang of the scramasax was inserted in a wooden horn or bone handle and tipped with a metal pommel, but there was normally no guard.

Some of the scramasax blades which were fashioned with a concave dip at the point and have fullers or grooves ground along the sides, although lacking a proper false edge, are remarkably like the Bowie or hunting knife of the nineteenth century. A number of these scramasaxes were found in the seventh–eighth century graves at Niederstotzingen, Germany.[2] A better-preserved example of this period is the so-called Hunting Knife of Charlemagne in Aachen Cathedral, the sheath of which is signed BYRHTSIGE MEC FECIT (Fig. 17).[3] The characteristic angle made by the back of the blade was a feature

17. Scramasax in sheath signed BYRHTSIGE MEC FECIT. The so-called hunting knife of Charlemagne at Aachen Cathedral.

which continued up to the fifteenth century. This type of blade can be seen, for example, on late fifteenth-century altar paintings in North Germany and Scandinavia. By this date, however, other types of knives with distinctive shapes of hilts had developed. Some, the rondel and quillon daggers, with double-edged blades, had been developed mainly as military sidearms, whilst others, like the ballock knife and the baselard, although worn by civilians were more suitable for defensive work than domestic purposes.[4]

The Hauswehr

The commonest form of civilian dagger in the late Middle Ages was still the single-edged knife-dagger designed to combine the function of a weapon and a domestic implement. The scramasax blade became broader and of narrower cross-section, and the edge curved to meet the back at the point. In many cases the pointed tang of the scramasax was replaced by a strip tang to which two plates of suitable material such as bone or wood

were riveted to form a handle. This form of knife can be seen being made in an illustration of a cutler's shop which appears in a 1476 manuscript (*Mendelbuch* f. 95v.) in the Stadtsbibliothek, Nuremberg.[5] A greater emphasis was placed on the cutting and hacking powers of the knife and the ability of the handle to withstand the resultant strains. When a pommel was fitted it was often made assymetrical, with an extension on the edge side to prevent the fingers slipping from the grip under pressure. The fingers were given slight protection by a small quillon protruding on the edge side of the handle. This also helped the thrusting powers of the knife. At right-angles to this quillon a small disc or ring is often fitted. This acts as a guard and as a cover to the smaller knives if carried in the scabbard. From the base of this ring a small metal squiggle runs a little way up the grip. What its purpose was other than for decoration is not apparent, but it continues to appear on hunting knives of this kind up to the end of the eighteenth century.

Typical knife-daggers of the late fifteenth century and early sixteenth century can be seen in the engravings by Albrecht Dürer (e.g. *The Cook and his wife*, *The Three Peasants* of *c.* 1495), and by Urs Graf (*The Dancing Peasant Couple*, 1525). Of a similar character are the knives carried by hunters in the tapestry known as '*Les Chasses de Maximilien*' woven in *c.* 1525, and now in the Louvre, Paris. The scabbards of all these knives are fitted with smaller sheaths for eating cutlery. Those of the chamois and ibex hunters depicted in Hans Burgkmair's *Triumph of Maximilian* (see pp. 8–9) have an extra sheath to hold the blades of their special spears. This type of knife-dagger, worn alike by the peasant in his daily tasks and by the hunter in his more specialized pursuits is referred to in some sixteenth-century German and Swiss documents as a *Rugger*, *Ruggner*, or *Ruggerli*.[6] It is now generally known as the *Hauswehr* (Fig. 18).

Skenes, Dirks and Ballock Knives

In seeking references to hunting knives in contemporary documents, especially in those of England, one is faced with the same confusion over names as one meets with in the identification of swords. An early reference to a hunting knife appears in 1386, when the London goldsmith John Bottesham supplied Richard II with a gold-mounted hunting horn and 'a knife to be used in the

woods' for £25 17*s.* 4*d.*[7] That great source of weapon information, the 1547 Inventory of Henry VIII's armouries and wardrobes contains a bewildering variety of knives. An unmistakeable hunting knife was the 'shorte stalking Knife wt skaberde and girdle of lether thafte of blacke horne the crosse blacke vernisshed';[8] one of the few whose scabbards were not fitted with subsidiary knives or tools. The difficulty of deciding whether

18. Huntsman restraining his dog. He wears a knife with riveted grips and eating knives in the sheath. Detail from an engraving in *Der Weisskunig* (1526).

the various 'woodknives' were swords, knives, or choppers has already been discussed. An added note of confusion is introduced by the word 'skene',[9] spelt in a number of ways. Thus some knives are described as 'woodknives skeines fasshion', one having a 'dog hooke plated wt gold'.[10] Other knives are simply called 'skaynes' and were usually fitted with one or two smaller knives and a bodkin. From an early date this type of knife seems to have had an Irish connexion. In the 1592 play *Solyman and Perseda*, attributed to Thomas Kyd, appears the lines:

> Against the light foote Irish have I serued
> And in my skinne bare tokens of their skenes.

of the companions of Philip the Good, Duke of Burgundy (1419–67), are wearing these ballock knives. The antiquity of this design is proved by the all-bronze dagger with an almost identical hilt in the Nationalmuseum, Copenhagen (No. B 7352), an example of a well-known group of Bronze Age short swords and daggers found in Scandinavia and North Germany. It was from this group of knives that the Scottish dirk is thought to have descended.[20] Although the early dirks had the typically rounded lobes for a guard, in the second half of the seventeenth century these became flattened and the sides were made to run parallel into the lines of the blade which was correspondingly wider at the base. The grip lost any resemblance to a phallus and the flat pommel was increased in size.

The single-edged blade of the dirk was often made from a discarded broad-sword blade, strong enough to be used as a fighting dagger and also suitable for hunting work. A few seventeenth-century dirks were fashioned with saw-backs to their blades.[21] In its fully developed form in the eighteenth century the back of the dirk blade was usually notched and fluted, and the grip was delicately carved with Celtic patterns. A French visitor to Scotland described these in 1799 as 'vermiculated knobs, formed in clusters and passing and repassing each other in the most graceful manner and without the smallest confusion.'[22] On most of the scabbards the accompanying knife and fork were placed one above the other. From the first quarter of the nineteenth century onwards the dirk became more and more an item of dresswear only, the grip being carved with a thistle or set with cairngorms or coloured glass. But the custom of using old sword blades continued and many a plain but serviceable hunting knife was made from these for the ghillie.

The Hunting Trousse

English ballock knife, Irish skene, and Scottish dirk, all these fighting knives were used for the hunt, but our main interest lies in the common hunting knife or *Hauswehr* and the great hunting trousses which developed from it. Contemporary illustrations of the fifteenth century show the *Hauswehr* with a number of subsidiary knives not normally exceeding three. In the sixteenth century, however, this number was often exceeded. Surviving examples of the knife vary from plain, iron-mounted

specimens with staghorn grips to magnificent examples of the cutler's and goldsmith's arts. The silver decorated hunting knife of Johann Friedrich, Duke of Stettin-Pommern in the State Historical Museum, Dresden, was made in *c.* 1590 and bears the mark of the Stettin goldsmith Egidius Blanke.[23] The blade is two edged with parallel sides and could be used as a dagger or heavy knife. The scabbard contains four small knives. The silver decorated hunting knife of the Duke Henry the Pious described in the 1567 Inventory of the Rüstkammer, Dresden, and still preserved there, has five scabbard knives (*'fünf beschlagene besteck'*). The blade, however, has a heavy blunt back.[24] This pattern of hunting knife, strongly resembling a butcher's chopper and carried in a leather case accompanied by various combinations of accessories became popular in the sixteenth century.

Such travelling sets of knives were not new to the hunting field. As early as 1380 the Inventory of Charles V of France included a set of two knives, a bodkin and a pair of forceps to be worn on a silver chain when riding through the forest (*'une cousteaux a clou, à porter en bois, c'est à scavoir un grand, un petit, un poinçon, avec les forcettes qui sont d'argent et est la gayne estoffée d'or, et la chayne a quoy elles pendent d'argent'*). The Inventory of the Dukes of Burgundy in 1420 mentions a large German knife accompanied by six smaller ones, a file, bodkin, and forceps (*'un gros cousteaul d'Alemaigne, garni de vi cousteaulx, une lyme, et ung poinsson et d'unes forsetes'*).[25]

By the end of the fifteenth century two main groups of these hunting trousses had developed. The first consisted of sets of knives for the carving and serving of the prepared meat. They were more elaborate versions of the fourteenth-century sets which consisted simply of a pair of large butcher's knives in tooled or *cuir bouilli* leather cases, the handles made flat to reduce the bulk. Some very handsome sets have been preserved, notably the pair of knives of *c.* 1355 in Vienna (No. D 198) (Pl. 54) and the silver and enamelled pair in the British Museum, which were made for John the Intrepid, Duke of Burgundy, between 1385 and 1404.[26] In 1496 the royal cutler Hans Sumersperger, of Hall in the Tyrol, made for Maximilian I the magnificent set of knives which is now in the Stift Kremsmünster (No. 45).[27] This consists of two heavy single-edged knives, a large one for cutting bones and sinews, and a smaller one for skinning and cutting meat; a table knife

and fork, and a large knife with a thin tongue-shaped blade (Pl. 55). The last was known as the *Waidblatt* or *presentoir* on which the meat was served or distributed. The use of one of these sets is described in an account of the household of the Duke of Burgundy in 1474:

the valet who was serving was to place his bread and the tranchoirs on the table, and then he was to draw the knives out of their case, and to place the two large knives (kissing humbly the handles in doing so) before the place where the prince is to be seated; and he must put the points towards the prince, covering these points with the cloth turned over them; and then he must put the handle of the small knife towards the prince—the reason of which is, that the large knives are to be used by the esquier who is carving, and therefore the handles are towards him; and the little knife is turned the opposite way because the prince is to help himself with it. And the esquier must take the meat upon his knife, and put it before the prince.[28]

A woodcut by Michael Wolgemuth in the *Schatzbehalter* (Nuremberg, 1491) shows such a scene.

The most common combination of knives, however, was made up of a *Waidblatt* or *presentoir* with a sturdy carving knife and fork. An elegant trio of this kind of *c.* 1600–10, in the Kunsthistorisches Museum, Vienna, which were made for the Emperor Rudolf II, have agate handles. A very similar set, dated 1619, is in the Banff Museum, Scotland. For want of a better term Charles Beard described it as a '*trousseau de diner*'.[29] The handles of this set are decorated with amber. Another amber-handled set (*Bernstein-Besteck*) in the Kunsthistorisches Museum, Vienna consists of the basic trio of serving knife, and carving knife and fork, plus a number of other knives and tools.

The second group of hunting trousses was concerned with the disposal of the newly-slain carcass, the gralloching, the jointing, and the removal of trophies. As was noted in the remarks on hangers (see p. 29) the English nobleman was not content to leave this bloody business to his huntsman but must perforce join in. In the 1575 edition of George Turbervile's *The Noble Arte of Venerie or Hunting*, a woodcut shows Queen Elizabeth being handed a sharp knife to assay or cut open the body of a stag (Fig. 20). On the Continent, however, the noble hunter, armed as he was with his great hunting sword, also carried a heavy chopping knife in a scabbard containing tools and eating knives.

20. Huntsman hands Queen Elizabeth I a knife to open a stag. From G. Turbervile's *The Noble Arte of Venerie or Hunting* (1575).

This chopper, decorated *en suite* with his sword, was known as a *Waidbesteck* or *Waidpraxe*. One of the earliest of these hunting garnitures is the German sword and companion *Waidbesteck* or trousse of *c.* 1520 in Dresden (No. M 53).[30]

The sword, which is of the type popularly associated with Maximilian I, has an inlaid grip with asymmetrical pommel, wide, straight quillons, and a long single-edged blade. It is interesting to note that this sword is described in the 1671 Inventory as '*ein Beidenfäuster*' i.e. for both fists, or, in other words, a 'two-hander'.

The accompanying trousse of heavy chopping knife and set of smaller knives is fitted with a similar grip and pommel. There is only one small quillon on the edge side of the blade. This kind of trousse, described in the 1668 Dresden Inventory as a '*Weidmesser*', can be seen being worn by the princes and their suites in the two paintings, dated 1544 and 1545, of a stag hunt by Lucas Cranach the Elder, now in the Prado, Madrid (Nos. 2175–6). The younger Cranach depicts them in his painting of the Sleeping Hercules and Dwarfs, dated 1551, in the Dresden Gallery. The grisly purpose for which these trousses were intended can be seen portrayed in one of the scenes of the *Coburg Chronicle*, a series of twenty-one hunting pictures painted by Wolff Pirkner for Duke John Casimir of Saxe-Coburg (1564–1633). The bodies of twenty-one stags are shown in the various stages of being stripped, unjointed, and skinned.[31]

The famous hunting garnitures at Dresden (the Emerald, the Turquoise, etc.) which included swords and trousses decorated *en suite* have been mentioned in Chapter 1. Of the plainer kind an example can be seen being worn by the owner, Johann Georg I, in a miniature by Daniel Bretschneider, dated 1647, in the Landesbibliothek, Dresden.[32] Another version of this miniature is in the Kretzschmar von Kienbusch Collection, New York. In both pictures the prince, in his hunting costume, wears his long sword on the left and his trousse on the right. The waist belt on which both hang also carries a small circular powder flask. In the Kienbusch Collection also is a sword and trousse very similar to those of the miniatures but bearing the initials and the date, 1662, of the Elector's successor Johann Georg II. From the same workshop is the garniture in the Tower of London (Pl. 10). The sword and knives have grips of staghorn, and the iron mounts are embossed with hunting scenes. They are heavy serviceable weapons. A trousse in the Scott Collection, Glasgow Museum, is of the same strong construction, the scabbard mounted in an iron frame with embossed panels bearing the arms of Saxony and Brabant, a recumbent stag, and a huntsman with his dog.

These large staghorn-gripped knives in their iron-framed scabbards are very typical of German hunting equipment made in the seventeenth century. The hunting tapestry made to the designs of Peter Candide (1548–1628) in the Bayerisches

Nationalmuseum, Munich, illustrates them in use (Fig. 21). A still-life by Cornelijs Gijsbrechts of 1671 at Rosenborg shows another trousse of this group, together with two hunting horns and a hanger. The actual trousse, which probably belonged to Prince Christian of Denmark, is still preserved at Rosenborg (No. 6–139) and is thought to date to *c.* 1630.[33] A combination of hunting sword and knife of a lighter and more decorative nature is the royal set of *c.* 1680 at Rosenborg (No. 6–137/8).[34] The hilts of the two main weapons have grey and red agate grips with silver gilt mounts. Both sword and chopper have two smaller knives in their scabbards with similar hilts. Although the local craftsmen of Copenhagen could well have produced these fine weapons it is tempting to ascribe the delicate goldsmith's work on the scabbard to some unknown jeweller of Paris, which was visited by Christian V of Denmark in 1662–3.

Fashion in design, however, spread quickly from country to country and it is very difficult to lay down any stylistic characteristics for any particular area. Nor is it easy to trace any pattern of development. The blades of the trousses vary from long, narrow, pointed examples like that of the knife in the Odescalcchi Collection, Rome (No. 1007) (Pl. 53), to a wide, square-ended specimen of the seventeenth century in the Capodimonte Museum, Naples (No. 2780).[35] The asymmetrical pommels and the checkered grips of this set seem to be copied from the designs of the sixteenth century. As a general rule it can be said that the later examples of these *Waidpraxes* or choppers have wide blades with square or rounded ends whereas the earlier specimens have more narrow, pointed blades. The German chopper of *c.* 1750 in the Kienbusch Collection (No. 443) has a large handle with iron pommels and quillon heads carved as lion heads.

Many of the later examples are of exaggerated proportions, and elaborate design. In the Wallace Collection (No. A 703) is a hunting trousse whose knife has a bronze-gilt handle in the shape of a stag attacked by a hound, and whose accessories, which include a bodkin and file, are mounted with handles cast as the heads and forequarters of hounds (Pl. 57). On the blade are etched the arms of Brandenburg and the initials of Georg Friedrich Carl, Markgrave of Brandenburg-Culmbach. This set is dated 1732. One of the last dated examples of a trousse is the silver-mounted set with a great staghorn-handled knife at Windsor

21. Details from the engravings by Joseph Anton Zimmerman (1705–96) after the designs by Peter Candito (1548–1628) for the tapestries of the Twelve Months by Hans van der Biest (1604–15) now in the Bayerisches Nationalmuseum, Munich. Both huntsmen wear heavy hunting trousses; the one on the left carries a wheel-lock gun.

Castle signed ANTHON RÜDOLFF KLEINE SCHWERDTFEGER ZU HANOVER 1789.[36] Heavy knives of this kind were probably worn as a badge of rank by the various forest keepers and hunters. This signed set may have been brought back from Hanover by George IV or by one of his jaegers when he was Prince of Wales, as the initials G.P. with a crown are etched on the blade. It is interesting to note that, in 1823, the cutlers I. & R. Cuff supplied the King with the following hunting implements in the form of a hunting trousse:

A Steel Hunting Hatchet with Hammer, Claw & Saw Mounted in Buck Horn Handle & highly finished	4 . 14 . 6
A Neat Leather Case blocked to fit Hunting Hatchet with Buckles & Straps	1 . 0 . 0
A Broad Belt with fixtures for the Above and for Coat	10 . 0
A Sett of Pocket Instruments with Keys, etc. for Hunting	1 . 11 . 6
A Leather Case to contain the Above and the Hatchet with Straps & Buckles for the Saddle	12 . 0[37]

Although this hatchet set does not survive at Windsor Castle, the same collection does include another trousse with copper-gilt pommels and quillon ends shaped as eagles' heads which appears to date to the early nineteenth century.

The firearm was, by now, undisputed master of the hunting scene, and, if need be, the wealthy hunter could indulge in an orgy of mass killing. For so many hunters the thrill of individual pursuit had lost its attractions and the personal combat between man and beast was shunned. Other thrills would appear to have been substituted on occasions. By the seventeenth century many formal rules and procedures had been laid down and were often followed with fanatical thoroughness. No code of honour was more closely adhered to. The *Coburg Chronicle* (see p. 60) illustrates the method of hunting employed by Duke John Casimir of Coburg (1564–1633). It also shows the punishment of 'blading'. Any contravener of the complicated laws of hunting was forced to kneel over the body of a stag where he was thrice whacked with the flat of the *Waidpraxe*. This was accompanied to the chant of a rhyme which can be roughly translated as:

Jo, ha, ho! this for the King, princes and lords,
Jo, ha, ho! this for the Knights, huntsmen and serving men,
Jo, ha, ho! and this by the good old law of noble venery.[38]

In the late eighteenth century, in Germany at least, huntresses as well were forced to submit to this light-hearted ordeal, the person of highest rank having the privilege to act as blader. This may partly account for the large number of attractive female followers who appear in the hunt paintings of the period.

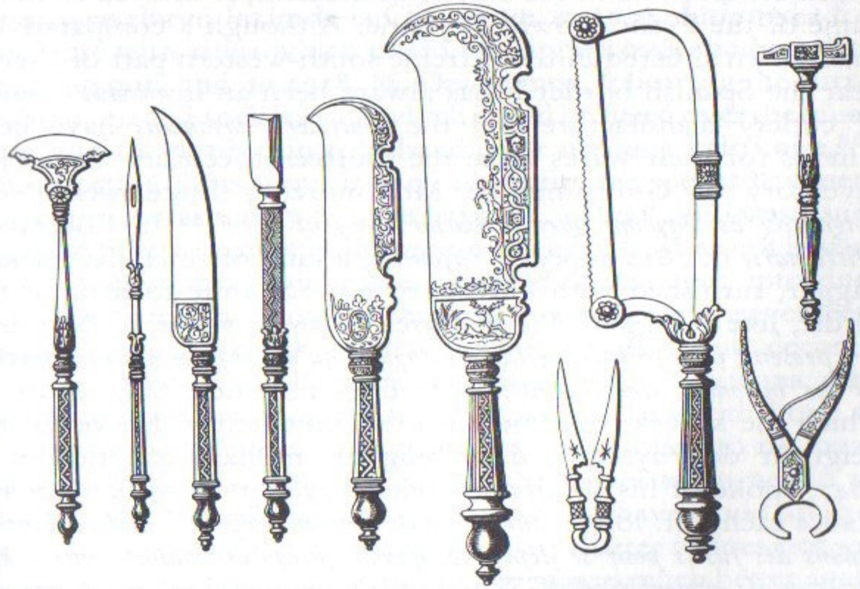
The hunting trousse with its capacious scabbards was occasionally adapted to other uses. An item in Henry VIII's 1547 Inventory, for instance, read as follows:

Item a shorte knife wt a skaberde of vellvet the locker & chape of copper & guilte wt a foote Rule a paire of Twitches a paire of compasses a hammer a knife a whtstone topped wt silver & gilte a paire of Cisars & a graver the pommell & hilt gilt having in the pommell an Inckhorne of Silver and guilte.[39]

This hunting knife *cum* travelling kit suitable for engineer's or surveyor's work does not seem to have been preserved but a not dissimilar set of accessories is contained in the hunting trousse of Johann Georg I at Dresden (No. M 262). The chopping knife differs from most of its kind in being fashioned like a short falchion, with a curved, backed blade, cut-out false-edge, and S-shaped quillons. The ebony handle is inlaid in silver with the inscription GOTTES GÜTE UND TREW IST ALLE MORGEN NÄW (God's Grace and Faith is fresh every morning). In the sheath are ten instruments: a knife and fork, two small knives, a pair of scissors, four dividers, and a rule engraved THOMAS PREGEL FECIT. The mounts bear the mark of the Dresden goldsmith Michael Botza. The maker's initials C.T.D.E.M. (for Christoph Trechsler the Elder, Mechanic) and the date 1619 appear on the other instruments.[40] The significance of the four dividers or pairs of compasses is not clear but the sign of the four dividers appears in the woodcut by Wolf Traut of *c.* 1517–18 which shows the Emperor Maximilian I as the patron of arms and artillery.[41] Another sword whose scabbard holds instruments by Trechsler, dated 1617, is the rapier of King Frederick II at Rosenborg (No. 2–38). These instruments with their calibre measures are without doubt for use with artillery. One would not normally associate the heavy hunting trousse with the equipment of a gunnery officer, but Joseph Furttenbach in his *Büchsenmeisterey* of 1627 recommends that the Master General should carry a strong pointed hunting knife (*'ein starcker gespitzter Waydner'*). The knife

could be used for cutting wedges or pegs for cannon or mortars, the blunt back acting as a hammer to drive them in. In the scabbard could be carried the following tools; an iron measuring pin, three touch-hole clearing pins, two straight rulers, an angled ruler, two calibre gauges, two pair of dividers, a pen for red and black ink, a knife with a saw-back, a scriber, and a sighting level.[42]

There remains one final group of knives and tools which are sometimes catalogued as hunting instruments. The full set consists of a large cleaver, a small cleaver, a small frame saw, a bodkin, a file and chisel combined, a hammer, a pair of small shears, a pair of pincers, and a small paring knife. There is also a tool with an arc-shaped, swivelling blade. A full set of these tools was in the Lord Londesbrough Collection (Fig. 22) and another was in the former Russian Museum at Tzarskoe-Selo. The latter set, which bore the arms of Saxony was described in a catalogue of 1835 as a sixteenth-century *trousse de vétérinnaire.*[43] Sets at Glasgow Museum and at the Tower of London Armouries have almost identical tools except that the hammer, pincers, and



22. Set of hunting or veterinary (?) tools. French, sixteenth century. Formerly in the Londesborough Collection. Drawing from Fairholt's *Miscellanea Graphica* (1857).

fact that so many of the existing sporting plug bayonets are of an ornamental nature leads to the natural suspicion that they were, like so many of the later hunting swords, more an item of dress wear than a weapon.

Very few of these bayonets, even when equipped with plain wood or horn grips, show any sign of use. The ivory or metal handles of others are so beautifully decorated that it would have been a crime to scour them with the muzzle of a gun. A fine Spanish bayonet with a chiselled-steel grip, in its original embroidered belt, signed JACOBUS LAVAU, MADRID, and dated 1778, is in the Musée des Arts Décoratifs, Paris (No. 22913) (Pl. 68). As an apparent indication of its intent the embroidered scenes on the belt show men attacking a boar armed with guns fixed with bayonets. Another similar bayonet by the same maker is in the Victoria and Albert Museum (No. 2238–1855). Bayonets of this all-metal construction, so delicately decorated, would have suffered immediate damage the moment they were put into action—apart from the damage caused to the gun barrel—and they must have been intended as exhibition pieces. Ornamental pieces of this kind were still being made in Spain in the nineteenth century. In the John Woodman Higgins Armory[52] is a plug bayonet by the Spanish armourer Eusebia Zuloaga made in 1845 and decorated in the most extravagant taste with gold and silver. It was clearly never intended for use. Enamelled and gilt specimens from the workshops of Toledo were a feature of international exhibitions in the middle of the nineteenth century.

This is not to say that the plug bayonet was never put into action. The Spanish painter Francisco Goya (1746–1828) often included them in his hunting paintings. His portraits of King Carlos III in the Prado, Madrid, and that of Carlos IV in the Capodimonte, Naples, show both monarchs in hunting attire with shotguns and plug bayonets of a plain, serviceable kind. In the Prado, also, is Goya's tapestry cartoon *Partida de Caza* of *c.* 1771 in which sportsmen with plug bayonets in their belts are shooting birds on the wing. Spanish sportsmen rarely used rifles which partly accounts for their continued use of the plug bayonet, for, with a muzzle made jagged with rifling grooves, the task of extricating a plug bayonet would be considerable. An Englishman in Rome, in 1835, noted that 'it was the fashion to have plug-shaped handles for the knives used in boar-hunting, so as to fit into the muzzle of the rifle; a very injudicious arrangement, as a very light thrust will often set the knife so firmly into the barrel as to render its removal by the hand alone impracticable'.[53] James Lavin[54] has suggested that most of the plug bayonets were really hunting knives, *cuchillos de monte*, being made in a conventional form. Some, in fact, were made with handles which could be unscrewed and reversed for better use as knives (Pl. 69). In another interesting group of bayonets—there is a fine specimen in the Kunsthistorisches Museum, Vienna—the quillons are formed as a small hammer and a screwdriver, copying a feature of some seventeenth-century military bayonets.

Early Combination Knives

As the efficiency of the sporting firearm increased so the need for a bayonet based on military lines decreased and although a few sporting rifles and guns including double-barrelled ones, were fitted with clip-on sword or knife bayonets, the perfection of the metal cartridge brought, for all intents and purposes, the end of the sporting bayonet. In the earlier, more uncertain days of the firearm amongst the crop of curious combination weapons, which any new mechanical development seemed to inspire, were some interesting combinations of knives or bayonets with pistols. One of the earliest surviving specimens is the sixteenth-century hunting knife of *Hauswehr* type in the Hermitage, Leningrad (No. B 564), whose blade is fitted with a wheel-lock pistol (Pl. 63). A similar knife, minus its grips, is in the Scott Collection, Glasgow. They are presumably the type of weapon included in a 1599 Inventory of the Tower of London Armouries as 'Dagges vij made in forme of a woodeknife pcell guilte wth a case of velvet'.[55] Another wheel-lock combination is the great chopping knife etched with a calendar dated 1540–46, in the Metropolitan Museum, New York (Pl. 64). A very fine wheel-lock knife with wide quillons perhaps more suitable for sword fighting than hunting was formerly in the collection of Prince Carl of Prussia.[56] In the same collection was a plug bayonet equipped with a neat, unobtrusive wheel-lock pistol. Fitting a firearm to a plug bayonet seems very much a case of gilding the lily but perhaps it is yet another indication that the bayonets were primarily knives or daggers. The flint-lock pistol was also combined with the knife or plug bayonet. Some of the knife pistols were highly impractical

weapons with the pistol in the handle pointing towards the holder.[57] For obvious reasons none of the plug bayonet pistols were constructed in this way. It is still difficult to see any real utility in any of them (Pl. 66).

All the elaborate sets of knives and the weird combinations which have been discussed in this chapter could not compete in convenience or practical value with the plain hunting knife *cum* dagger. By the eighteenth century the hunting knife began to take on national characteristics of decoration and design. In Scotland the dirk, the sole survivor of a medieval pattern, was embellished with Celtic carvings. The German cutlers continued to favour rough staghorn handles with iron rivets and mounts. French hunting knives, following the example of the hangers, had smooth horn or wood grips riveted in more decorative fashion. In both countries the influence of rococo fashion can be seen in some of the better quality brass- and silver-mounted knives. A particularly fine example in the Hermitage, Leningrad (No. 2811), has chiselled and gilded steel mounts and is contained in a white shagreen scabbard. It bears the double monogram of Louis XV (1715–74) and the inscription:

A LA CHASSE A LA TABLE
UNE MAIN REDOUTABLE
QUE CONDUIT MON TRANCHANT
MET EN PIECE LE MORT
FAIT TRAMBLER LE VIVANT

In the European countries bordering the northern coastline of the Mediterranean Sea—Spain, southern France, and Italy—an entirely different form of knife-dagger developed. Whether single or double-edged it is essentially a stabbing knife and is often little more than a large stiletto. The handle is made of a single piece of wood or horn often spirally fluted. It is pierced for the tang of the blade which is riveted to a small metal cap which takes the place of a pommel. A guard is also dispensed with, the handle joining the blade in a columnar ricasso, faceted, or chiselled. The base of the blade on the better specimens is also chiselled, pierced or engraved with decoration. A special group of these knives incorporates the bodkin which we have seen was an essential feature of the hunting trousses. On some the tang is fashioned as the tool, the handle screwing on to the base

of the blade (Pl. 59). On one knife in the Hermitage (No. C. 277) the handle is fastened to the bodkin which screws through the base of the blade into a slot cut down its centre. These bodkin knives have in the past been suspected of carrying poison, even the bacilli of the plague.[58]

The special form of long folding knife peculiar to Spain, the *navaja*, made mainly in the cutlery centre of Albacete, is not normally associated with hunting, and it was held in high regard mainly as a weapon for fighting, duelling, and throwing.[59] But it had its sporting uses and as late as *c.* 1930 the London cutlers, the Wilkinson Sword Co. Ltd., included their version of the knife in their *Catalogue of Hunting and Sporting Knives*.

Nineteenth-century Knives

In Europe, in the nineteenth century, with the spread of so-called civilization, the custom of wearing a general purpose knife practically ceased and the hunting knife became a specialized instrument. In the New World, however, the American and Canadian settler still lived a life where it was necessary to be on continual guard against human and animal foe, and it was to the new countries across the Atlantic that the cutlers of such manufacturing centres as Sheffield in England, Châtelleraut and Thiers in France, and Solingen in Germany now turned their attentions. A large number of knives of the plain butcher's kind, strong enough to be worn as a belt knife, appear to have been exported to America. Many of them were intended for the Indians as presents and trade goods and, by the beginning of the nineteenth century, such companies as the Hudson Bay Company had various types or grades of knives for the purpose; cartouche knives with a choice of horn, mock stag, wood- or brass-inlaid handles; scalpers or skinners with stag or redwood handles; and great chief knives with pointed chopping blades resembling the knives of the seventeenth-century hunting trousses. Most of them made in Sheffield by such contractors as Jukes Coulson & Co. were stamped with the Company's fox mark. These plain butcher's, skinning, or hunting knives were also made in America from the 1830s onwards by the firm of John Russell & Co. at their Green River Works, Greenfield, Massachusetts. The name of the works stamped on the blades caught the public eye and the Green River knife became so well known and admired

that the Sheffield cutlers were forced to stamp their own brands with the name. In fact, the Green River knife is still being made today (Fig. 23).

In the 1830s also great impetus was given to the wearing of belt knives by the fame of the Bowie knife. It was named after

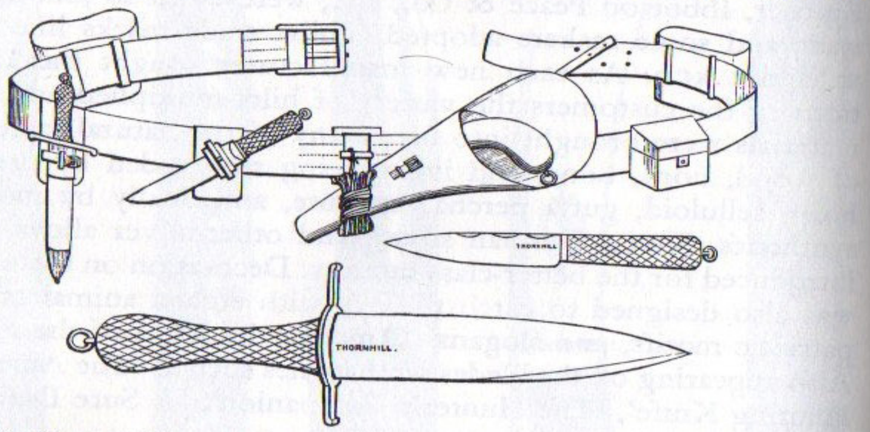
23. Hunting knives from the 1901 Catalogue of H. G. Long & Co., Sheffield. On the far right is a 'Green River Knife'.

a hunting knife used by the frontiersman and soldier James Bowie (1795–1836). Although the exact design of the original Bowie knife is not certain the name began to be applied to all big single-edged knives which could be used for fighting, hunting, clearing ground, chopping wood, etc. The original knives

were made by American smiths in the Mississippi, Arkansas, Louisiana, and Texas regions. The blades usually ground with a false edge, ranged in length from 9–15 in. and could be up to 2 in. wide. The guard was a metal quillon sometimes bent to an S-curve and the plain grips were of wood, bone, or horn. When the popularity of the Bowie knife was firmly established the English cutlers began to export their own models. George Wolstenholm, founder of the Washington Works in Sheffield, was one of the first to send over English Bowie knives bearing his trade mark IXL. Other Sheffield firms, Joseph Rodgers & Sons, W. & S. Butcher, Ibbotson Peace & Co., etc., were quick to join in the trade and some makers adopted similar trade marks like NON XL and I XCD. As each new manufacturer sought the attentions of the customers the variety of hilts multiplied and new materials were brought into use, many of the natural materials of wood, horn, bone, and ivory being superseded by pressed horn, celluloid, gutta percha, xylonite, and finally by modern synthetics. Silver, German silver, and other silver alloys were introduced for the better-class mounts. Decoration on the blades was also designed to catch the eye with etched animal scenes, patriotic motifs, and slogans ('America the Land of the Free'). Also appearing on the blades were names such as 'The American Hunting Knife', 'The Hunter's Companion', 'A Sure Defence', 'For Stags & Buffaloes', etc.

The English manufacturers were not only concerned with the American market. The colonies of the British Empire offering vast and varied hunting grounds were a spur to the enthusiasms of Victorian sportsmen. The books of adventurer writers like Sir Samuel Baker, Gordon Cumming, and H. A. Leveson ('The Old Shekarry') fired their imaginations, and countless officers and wealthy amateurs set forth to hunt game of all kinds over terrain ranging from close jungles to barren plains and mountains. The Old Shekarry in his *Wrinkles; or, Hints to Sportsmen and Travellers* (London, 1874), made sure that his readers went properly equipped, if slightly overloaded. His recommended Hunting Belt (Fig. 24), apart from a large pistol and pair of field glasses, had suspended from it a hunting knife and a skinning knife by Thornhill of Bond Street, London. The blade of the former, he asserted, could cut through a dollar. Even for pig-sticking he advised his readers that 'a serviceable 7-in. blade hunting knife that

can be carried in a belt, and worn behind in the hollow of the back, often comes in handy at an awkward pinch.'[60] Very similar to the Old Shekarry's knife was that designed by Colonel Henry Shakespear in *c.* 1860 and made by Wilkinsons of London. This knife, however, had no guard and only a plain chequered grip. Shakespear described it as 'some seven inches long, and one and a half broad in the blade, partly double-edged, fluted, coming to a keen point, and kept as sharp as possible. There is a spring in the sheath which catches the handle of the blade when it is down in the sheath; when required for use this spring is pressed



24. 'The Hunting Belt and its Appurtenances'. From The Old Shekarry's *Wrinkles; or, Hints to Sportsmen and Travellers* (1874).

open with the little finger, at the same time that the hilt is grasped.'[61]

The assortment of equipment with which the Victorian sportsman saw fit to burden himself and his carriers has its humorous side, but his camp life was not as luxurious as that of the modern safari, and, at least, he did not shirk a hand-to-hand encounter. In the Ceylon section of the Colonial and Indian Exhibition held in London in 1886 were exhibited leopards killed by a Mr. R. Beauchamp Downall of Barnes Hall, Nuwara Eliya, with a hunting knife when out hunting elk with a pack of hounds.[62] Sir Samuel Baker, more famous for his shooting exploits, claimed to have killed four hundred sambar or deer with a hunting knife and the aid of dogs only.[63] He describes such hunting in *The Rifle and Hound in Ceylon*, as 'trying work, but it is a noble sport; no weapon but the hunting knife; no certainty as to the character of the game that may be found; it may be either an elk (sambar), or a boar, or a leopard; and yet the knife and the good hounds are all that can be trusted in.' His favourite hunting knife was made from a cut-down Scottish broadsword blade (stamped Andrea Ferrara), 1 ft. 6 in. in length and 2 in. wide, about 3 lb. in weight, double-edged, and as sharp as a lancet. With this knife, on one occasion, he stopped a charging boar in its tracks by stabbing it clean through the spine and shoulder into its vitals.

Another man who sought out the wild boar with his knife was the Portuguese hunter J. P. Falcão. His method was to jump on the boar's back, grasp the thick mane with his left hand, and plunge his hunting knife behind the shoulder blade between the first and second rib. The favourite knife for this sort of work was the Sheffield-made Bowie of the kind already described. Such was the demand for it in India that the native armourers, always ready to turn out a copy of a European weapon, produced their own brands of hunting knives. Some of the most popular, and often mistaken today for American-made products, were the Bowie-type knives of the firm of Arunachalum & Company, of Salem in southern India. They signed their blades ARNACHELLAM SALEM.[64]

Combination Knives

The Victorians, probably more than any of their predecessors, delighted in gadgetry. Typical of the combination weapons designed during the nineteenth century was the patent Baldock Knife Spear, made for Walter Locke & Co. Ltd. by the Sheffield firm of James Dixon & Sons. This was a saw-backed knife with a hollow metal handle which could be locked on to the end of a specially-made shaft to form a spear. The great variety of complicated knives being made in the middle of the nineteenth century can be seen in the advertisements of such firms as Unwin & Rodgers of Sheffield who, amongst numerous types of cutlery, listed American Bowie knives, Indian hunting knives, and their famous pistol knives (Fig. 25).

The pistol knife, although known as early as the sixteenth century, really began its period of popularity with the introduction of the percussion pistol. One of the first to take advantage of the

latter's small and convenient mechanism was George Elgin of New York who was granted American patent No. 254 in 1837 for a pistol knife or cutlass. The weapon was simply a single-shot percussion pistol with a blade fitted under the barrel, the larger specimens measuring up to nearly 18 in. long. Although Elgin's idea was that either a cutlass blade or a Bowie knife blade could be fitted, on the majority of models, believed to have been made for a U.S. Exploration Expedition which surveyed the South Seas between 1838–42, the blades were of the Bowie kind.[65] The

25. Unwin and Rodgers's advertisement from the *Sheffield Trade Directory*, 1845.

Elgin Bowie knives were to prove a failure as a financial venture, but they set the fashion for a new phase of combination weapons. In France daggers with a pistol barrel on either side of the blade and the mechanism concealed in the handle were made in different sizes. A very similar pistol knife to the Elgin was also made in France with a pin-fire revolver as the firearm. This was patented in England by H. A. Bonneville in 1864 (No. 130).

In England, Unwin & Rodgers developed the idea further by manufacturing a pocket knife with a folding dagger blade and a small percussion pistol built into the handle. In an 1839 advertisement the manufacturers described their 6 in. long weapon as a Life and Property Preserver. With the aid of a gimlet-like trigger the pocket knife could be screwed into the door-post

to act as a burglar alarm or, held in the hand, it could kill at 50 yd.—or so the claim read.[66] It was not made clear exactly what could be killed at that distance, but many sportsmen set great store in the knives and amongst the knife's accessories was included that most popular of instruments, a hook for removing stones from horses' hooves. The Unwin & Rodgers pistol knife converted to a breechloading model for cartridges was patented in 1860 (No. 2081) and, in 1862, its range was stated to be between 100 and 130 yd.[67] Another popular sportman's knife—it can be seen illustrated in H. Miles's 1860 edition of the *Book of Field Sports*—was Hans Busk's Rifleman's Knife.[68] This was a pocket knife and screwdriver to which was attached a removable kit consisting of an oil-bottle, drift, worm, cramp, etc., suitable for cleaning a gun and removing a jammed bullet.

The artistic aspirations of the nineteenth century is reflected in the designs of hunting knives, particularly those of an ornamental nature. France was a predominant influence, with its emphasis on neo-classical lines, columnar grips with urns decorated with trophies. By the 1840s experiments in London and Paris with new techniques were producing cast-metal hilts ranging from the baroque to the bizarre. The hunting knife of the Emperor Francis Joseph I (1848–1916) in the Kunsthistorisches Museum, Vienna, has a hilt cast in the shape of the bear. King Frederick VII of Denmark had a great fondness for swords and daggers with cast-iron hilts. The cast-iron dagger which he was wearing on the occasion of his riding accident in 1855 is at Rosenborg.[69] The *Official Catalogue* of the Great Exhibition held in London in 1851 illustrates some of the hilts submitted by the Paris metalworker and designer Froment-Meurice. The hilt of the hunting knife is in the form of a poacher caught in a man-trap (Fig. 26).

It must be stressed that these extravaganza were strictly for dresswear to be displayed on some ducal or festival hunt. The ordinary hunting knife remained the traditional affair with staghorn or wood grips riveted to the tang. But the mounts of continental knives, if of brass or silver, were usually cast appropriately as the heads of dogs, stag, or boar. Unlike their American brothers the continental sportsmen now showed little desire to join in the messy business of the disposal of the carcass and many of the blades were of two-edged dagger design intended as

weapons of self-defence only (Pl. 61). In recent years there has been a breakaway from the Imperial German and Nazi form of hunting knife back to the designs of the seventeenth century with a heavy chopping knife supported by smaller knives.

26. A poacher caught in a man-trap. The hilt of a ceremonial hunting knife by Froment-Meurice, Paris, from the *Official Catalogue*, Great Exhibition, London, 1851, No. 1720.

Oriental Knives

No mention has been made of Oriental hunting knives for the reason that it is not possible to designate any particular Eastern knife as one meant for sport alone. In Indian and Persian hunting pictures of the seventeenth and eighteenth centuries, if a hunter is wearing a knife or dagger, it is the one which he could wear for everyday wear in any case (Fig. 27). The most widely used

27. Young hunter armed with a matchlock gun, a powder flask and an unusually long *kard*, a knife which had a straight blade and no guard, the grip sinking half into the scabbard. From a Persian painting of *c.* 1600 by Habib-Allah of Meshed. *Islamisches Museum, Berlin.*

knife for hunting was the Arab *jambiya* which had a curved cutting and stabbing blade and is found in countries right across North Africa through Turkey and Persia to India. Within this group of knives are the Indo-Persian *khanjar* often bearing fine jade and jewelled hilts and the *peshkabz* with ivory hilts. The Sinhalese knife-dagger the *piha-keetta* has already been compared with the scramasax. Another localized knife with a blade not unlike the European hunting chopper but with a distinctive form of hilt with a large round pommel was the Coorg or Tamil *pichangatti*. Something akin to this was the *moplah* of the Malabar Coast. The national knife and principal weapon of the Gurkhas of Nepal, the *kukri*, seems to be a direct descendant of the Greek *kopis* and is used with equal effect. It is best known as a war weapon and there are authenticated stories of a Gurkha cutting a man almost in two. But it was also used as a jungle and hunting knife. So confident of its powers was the Gurkha hunter that he did not hesitate to tackle a tiger single-handed. The animal was first provoked into a spring. The Gurkha leapt to one side striking at the tiger's paw so that it was nearly severed. When the tiger sprang again with the paw hanging helpless the Gurkha went in closer delivering a killing blow either on the back of the neck or at the throat (Fig. 28).[70]

The chopping knife used by the Malays was the *golok*. This had a convex curved cutting blade. Another single-edged knife, but with an outline more like that of a spear was the *barong*, the national weapon of the Moros of Sulu and North Borneo. All these knives were capable of delivering a chopping blow enough to bring down most animals. The blades most revered for their effectiveness and quality were those of the Japanese. But the only knife specially designed for hunting in Japan seems to have been the *nata*, a small hatchet with a chisel-edged blade and blunt or scroll end.[71]

Finally on the subject of knives, mention must be made of the throwing knives of Central Africa used in hunting as well as war. Many knives could be thrown, even the great Spanish clasp knives, the *navaja*, but the African throwing knife of the Congo and North Cameroons was something quite exceptional. Known, according to the locality, by such names as *trombash*, *kulbeda*, or *pinga*, it can be traced back to antiquity and can be seen in the hands of Libyans on the wall sculptures at Tel el Amarna of *c.*

1400–1300 B.C. It was made up of a number of blades fastened to a central stem in asymmetrical fashion. The tang was inserted in a plain cylindrical wooden handle or simply bound with leather or cord. The knife was thrown horizontally and had a

28. Gurkha killing a tiger with his kukri. The tiger's right paw has already been disabled. From J. G. Wood's *Man and his Handiwork* (1886).

maximum range of approximately 100 yd. At half that range it was reasonably accurate and at shorter distances could hamstring an animal or even cut off a leg. In a modern test at 15 yd. it was found to pierce a deal board 15 mm. thick. The blade patterns, although of individual character, appear to follow certain basic

designs—one looks like the letter F—and E. S. Thomas has divided them into eighteen groups.[72] Flat, thin sheets of iron cut into conventionalized representations of a throwing knife were used as currency (*woshele*) amongst the Bantuto of the Belgian Congo.

Chapter Three

Staff Weapons

The Barred Spear

The spear is one of the oldest of hunting weapons. With its wooden shaft tipped with flint or bone, or simply pointed and hardened, primitive man was able to inflict an effective wound in a large animal, at the same time keeping out of range of any retaliatory blow from claw or tooth. At least he was able to do this if the spear did not enter too deep because of the strength of the thrust or the impetus of the animal's charge. It will never be known when hunters first realized the advantage of fitting some kind of a stop behind the blade to prevent this. Perhaps Neolithic man with his great technical ability with stone and wood was the first to insert a wood or bone crossbar in the thonging of his spear. Certainly by the Bronze Age there are indications that some hunters appreciated the value of this device. In the Ashmolean Museum, Oxford, there is a bronze spearhead of surprisingly sophisticated design. Cast with a heavy centre for strength it has two protruding cutting edges and two large stop pegs at the base. A very similar type of bronze spear was found at Plaistow, Essex. On this specimen the pegs are replaced by a long pin.[1]

A Persian cylinder seal of *c.* 600 B.C. in the British Museum (No. 89144) illustrates a horseman chasing a boar and quite clearly shows a crossbar on his spear. Xenophon, giving his advice on the best methods of hunting the wild boar, wrote in *c.* 400 B.C.:

> The spears must have blades fifteen inches long, and stout teeth at the middle of the socket, forged in one piece but standing out, and their shafts must be of cornel wood as thick as a military spear . . let him present the spear, taking care that the boar doesnt knock it out of his

hand with a jerk of his head, since he follows up the impetus of the sudden knock. . . . He (the hunter) must . . . thrust it inside the shoulder-blade where the throat is, and push with all his might. The enraged beast will come on and, but for the teeth of the blade, would shove himself forward along the shaft far enough to reach the man holding the spear.[2]

The basic design of the barred or winged hunting spear was thus established at an early date, but universal adoption of the design did not follow. Representations of an Etruscan boar hunt carved on an alabaster urn in the Museo Archeologico, Florence (N. 5697), show that the Etruscan hunters did not agree with Xenophon's recommendations. They face the boar with a type of spear whose shaft was strong enough but whose blade had little but a thickened edge to its socket to stop it sinking into the body of the boar. A pebble mosaic at Pella, Macedonia of *c.* 300 B.C., illustrating a lion hunt, includes a hunter with a spear which has no kind of hindrance to its insertion at all. A very similar spear can be seen in the Roman mosaic in the Great Palace at Constantinople.

On the other hand one of the hunting mosaics in the Roman villa at Piazza Armerina, Sicily, depicts a huntsman attacking a boar with a stout spear below whose blade protrudes a crossbar, curled back on both sides.[3] Frescoes in the Roman 'Hunting Baths' at Lepcis Magna, Tripoli also show hunters using spears with down-curved crossbars—against leopards.[4] Very similar spear blades which have been dated from the ninth to the twelfth centuries A.D. have been found in Finland. On at least one example the drooping bars have been roughly fashioned as dogs' heads.[5] Other forms of crossbars can be seen on spears in Roman paintings or mosaics depicting the gladiators, known as *bestiarii*, who fought against wild animals in the arena (Fig. 29). In the Hereford City Museum, there is a curious spearhead which was found during the excavation of a Roman farm building of *c.* A.D. 300. The narrow leaf-like blade has a long socket terminating in two langets. Riveted through these langets are the remains of an iron crossbar. It is not the type of spear normally associated with Roman artifacts and is not unlike the iron, winged spearheads found in Lombardic cemeteries of the ninth to tenth centuries A.D.

Illuminated manuscripts of this period give little information

for the spears drawn in hunting scenes do not differ from those of battle and in so many instances are the artist's stylized impression of the weapons.[6] A solid ball drawn below the blade, for instance, may have been intended to indicate a swelling in the socket or a thick collar or ferrule; but it is hard to believe that the two or three

29. Roman *bestiaire* or animal fighter from a mosaic at Rheims.

horizontal lines which are so often sketched below the blade necessarily meant the same number of crossbars. The Bayeux Tapestry, a usually rich source of information, gives little help on spears. No separate pattern can be discerned in the design of the spears carried by hunters, messengers, or soldiers on foot or horse. One, two, or three crossbars have apparently been sewn in at the whim of the embroidress. All that one can conclude from examining the various sources is that in the early Middle Ages no special type of hunting spear was evolved, and that the same

spear, with or without crossbars, took part in sport and war alike.

Examination of actual specimens of this period does not confirm the existence of any multi-barred spears. The most common type of spear encountered has a long narrow blade with a socket from which protrudes on either side a flat triangular wing or ear with a blunt end. But as some of these have large rivet heads jutting out as well it may have been this type of spear which artists were attempting to depict with their conventional representations. This spear with wings on either side to prevent the shaft from entering too far—the *lancea uncata* of Sidonius Apollinaris[7]—is generally referred to now as the *Flügellanze*. It was the general purpose weapon of the Carolingians and has been found in most parts of Europe. On some examples the remains of damascened decoration can be seen.

In the fourteenth century the blade of this spear began to change to a triangular shape, whilst the wings became more pointed and larger. This distinctive form of winged spear is now sometimes described as a Bohemian ear spoon (*Böhmische Öhrlöffel*) although there is no reason to believe that it was confined to that area of Europe. Special forms of spear for hunting began to be recognized. In *c.* 1300 the French boar hunter was advised to carry a strong, sharp spear with a bar ('*ung espien de fer fort bien trenchant et croisé*').[8] In England, in 1394, there was a reference to a 'borspear'.[9] In the 1407 Inventory of the Armoury of the Gonzagas at Mantua appeared 'one hunting spear (*unus spetus a venando*)'.[10] By the end of the fifteenth century several distinct groups of weapons had developed from the winged spear, differing in the size and shape of the blades and wings. At one end of the range was the partisan, its long triangular two-edged blade having but two small upturned lugs or rudimentary wings at its base. In contrast was the *rawcon*, *ranseur*, *Runka*, or *corsèque* whose central blade was flanked by two long blades radiating from its base or curving up like the prongs of a trident.

Whilst early woodcuts and engravings make it clear that, on occasion, all these different forms of hafted weapons were pressed into action for the hunt, the hunting spear most commonly illustrated was of the 'ear spoon' type. It was probably of this kind of spear that Gaston Phoebus wrote, in 1387, when he gave this advice to the hunter; '*Il doit avoir son espieu croysié, bien agu et bien taillant et bonne haute*'.[11] The fifteenth-century hunting spear or *Knebelspiess* is portrayed very accurately in the Devonshire Hunting Tapestries of *c.* 1425–50 in the Victoria and Albert Museum, and can be seen in the printed versions of *Le Livre du Roy Modus* published in 1486 (Fig. 30). Two fine examples are the spear of Emperor Frederick III (1415–93) in the Kunsthistorisches Museum, Vienna (No. A 32) (Pl. 47), and the spear, possibly English and formerly in the Meyrick Collection, which is now in the Metropolitan Museum of Art, New York (No. 14.25.321). The blade of the latter is inlaid with bronze chevron

30. Huntsman spearing a boar after it has been driven into nets. Woodcut from *Le Livre du Roy Modus* (1486).

bands and the wings are engraved with hunting scenes (Pl. 48). In very similar style and probably from the same workshop is the spear in the Museo Stibbert, Florence (No. 2281).

The fifteenth-century manuscript of Gaston Phoebus's hunting treatise in the Bibliothèque Nationale, Paris (MS. 616), shows not only the winged spear but also a type of spear with a plain socketed blade having a crossbar—apparently a boar's tusk—stuck through the thonging or strapping below the base of the blade. This kind of spear, which achieved much the same purpose as the older form of winged blade, but was much lighter to carry, cheaper to make, and easier to wield, became increasingly popular in the sixteenth century. A Flemish manuscript calendar of the early sixteenth century in the British Museum (Add. MS. 24098, f. 28b.) includes an interesting illustration for November. The scene shows the return from a stag hunt. One of the huntsmen

carries a spear whose blade has a crossbar forged integral with the blade; another shoulders a winged spear which has an additional crossbar apparently tied to the shaft. That source of so much interesting armour detail, the *Triumph of Maximilian*, includes a group of bear hunters carrying broad-bladed spears with crossbars which appear to be tied to the shaft just below the socket (Fig. 31).

31. Detail from Burgkmair's engraving of the Bear Hunters in the *Triumph of Maximilian* (1526). Note the number of small knives in the scabbard of the huntsman's knife.

Spears made specifically for bear hunting were of stouter proportions than the rest—the blades of some are nearly 2 ft. in length. The ordinary hunting spear was between 6 and 7 ft. long, with a blade of 12–18 in., and it was employed against all forms of game. Sixteenth-century books on hunting show the same spear in use against deer, wolves, foxes, and even hares. The animals were either hunted down with a pack of dogs or

32. Detail from an engraving of Actaeon and Diana by an unknown German sixteenth-century artist. This was a favourite subject for the decoration of hunting weapons. From G. Hirth, *Les grands Illustrateurs*.

driven into a netted area for the kill (Fig. 32). Gaston Phoebus advised his readers to approach a boar on horseback at a trot, not a gallop, with shortened reins and short stirrups so that the rider could manoeuvre easily. He cautioned against holding the spear like a jousting lance. As for approaching the boar on foot alone this was a dangerous procedure. 'Hold your spear about the middle, not too far forward lest he strike you with his tusks, and as soon as the point has entered the body, take the haft of the spear under your armpit, and press and push as hard as you can and never let go the haft, and if the beast be stronger than you then you must turn from side to side as best you can without letting go the haft, until God comes to your aid or other assistance reaches you.'[12]

A more acrobatic method was practised in Ceylon with the boar spear known as the *I-itiya.* This had a strong 7 ft. shaft headed by a blade 6 in. long and 2½ in. wide. The beaters drove the boar towards the hunter who rushed at the charging boar and, as his weapon pierced it, vaulted into the air thus leaning all his weight on the spear and driving it home.[13] Whether this spear had any form of crossbar or stop is not known. A late eighteenth-century Indian painting of a tiger hunt in the Victoria and Albert Museum, London (I.S. 563–1952), shows a beater holding a spear with a pointed, leaf blade whose socket has a wide rim. The blade appears to have been hollowed out on either side of the central rib, presumably to lighten it. The special Japanese boar spear *Inoshishi-no-yari* is cut away in similar fashion.[14]

That the sixteenth-century hunting spear was also regarded as a military weapon can be judged by the fact that the Almain mounted mercenaries hired by Henry VIII for his army in France in 1544 were reported to be armed with handguns and boar spears. One of them in a drunken brawl ran his spear through the throat of an English soldier.[15] Henry VIII was a great lover of the boar hunt and, like all princes, enjoyed the privilege of possessing weapons of fine quality. The 1547 Inventory of his arms and armour included at the Tower of London:

> Bore speares wt asshen staves trymed wt crymesyn velvet and fringed wt redde silke.
> Bore speares knotted and lethered.
> Bore speares wt asshen staves trymed wt lether.
> Bore speares graven and gilte.

and at Greenwich:

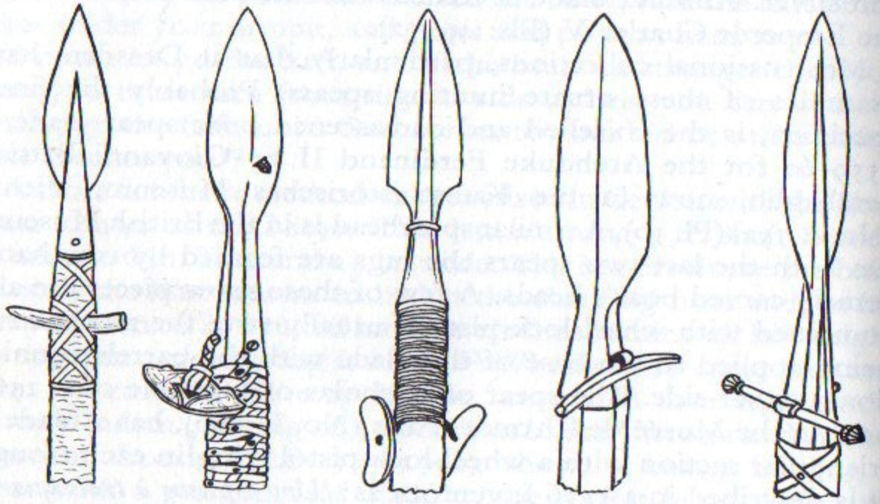
> Bore speres heddes white
> Bore spere heddes pcell graven and guilte
> Bore spere-hedde of morisco worke.[16]

In the Tower of London today is a fine French boar spear of *c.* 1610 with the lower portion of its blade damascened with gold and silver. Another blade is etched with the arms and motto of the Emperor Charles V (Pls. 49, 52).

Most national collections, particularly that at Dresden, have examples of these ornate hunting spears. Probably the finest specimen, is the chiselled and damascened boar spear made in 1559–60 for the Archduke Ferdinand II by Giovanni Battista Serabaglio, now in the Kunsthistorisches Museum, Vienna (No. A 752) (Pl. 50). A similar spearhead is in the British Museum. On both the last two spears the lugs are formed by two handsomely-carved boar's heads. A few of these show pieces are also combined with wheel-lock pistols, usually two, the mechanisms being applied to the base of the blade with the barrels running down either side. The spear of Nicholas of Lorraine of *c.* 1565, now in the Musée de l'Armée, Paris (No. K 660), has a blade of triangular section with a wheel-lock pistol lying in each trough. It is described in a 1576 Inventory as: '*Ung espieux à trois quartz, damasquiné, environné de trois petitz pistoletz à rouetz.*'[17] These wheel-lock pistol spears were nearly always of German manufacture and, in common with most combination weapons, were extremely clumsy, unbalanced, and often not so effective as the straightforward spear.

The common work-a-day spears boasted no such refinements, but the materials from which their crossbars were made and the methods by which they were attached to the hafts are no less interesting. To start with, in the fifteenth century, the bar was a piece of wood or horn held firmly in position by thonging. It was then realized that if the bar hung loose it was still effective and was not so liable to cause accidental injury to the bearer or his companions. The piece of horn forming the bar, often only roughly shaped, was fastened to the haft by a leather strap passing through a hole in the socket or woven into the binding which normally criss-crossed the head of the haft to provide a grip. Sometimes the horn was decorated or inscribed with a good-luck

sign. In the Kienbusch Collection is a spear which has a horn toggle engraved with the arms of Duke Christian of Saxe Weissenfels and the date 1727. A number of similar spears are in the Historisches Museum, Dresden. Iron bars, being more durable and stronger, were sometimes preferred to horn and these were fixed to the socket by hinged or swivelling attachments (Fig. 33).



33. Hunting spear fittings. *Left to right*: Tusk thrust through the binding (from fifteenth-century MSS. of Gaston Phoebus); single decorated ivory plaque held by straps. German, seventeenth century (*Staatliches Museum, Burg Falkenstein*); two bone plaques held by thongs (*Museum der Völkerkunde, Vienna*); hinged iron bar. Italian, *c.* 1560 (*Tower of London Armouries*); swivelling iron bar. German, *c.* 1600 (*Tower of London Armouries*).

The hunting spear with its distinctive crossbar continued in use throughout the seventeenth century, but, by the middle of the eighteenth century, the flint-lock firearm had developed to the extent that it was being used extensively as the main weapon by the hunting fraternities of Europe. The spear became more and more the protective arm or ceremonial insignia of the hunt servant. But it still offered to the jaded appetites of the noblemen the thrill of a hand-to-hand contest between man and beast, and the ruling classes of Germany and Russia continued to pursue the boar with the spear in the fashion of their ancestors. Enthusiasts kept the sport alive and, in 1938, the Solingen sword

cutler Eickhorn was able to offer customers the choice of two boar spears:

No. 1780 *Schwere Ausführung* [heavy type]—45 reichsmarks

No. 1447 *Leichte Ausführung* [light type]—28 reichsmarks

Manufacture continues today.

Lances

The word lance was originally synonymous with 'spear' in the general sense of the word, but from the seventeenth century onwards it was usually applied to the spear with a long shaft and small head or blade. Today it is regarded mainly as a military arm, but from an early date this form of spear was often brought into use for the hunt. Thirteenth-century manuscript illustrations of the unicorn hunt, for instance, sometimes show the animal being killed by a man in mail armed with a lance (Fig. 34). As a hunting weapon proper it had limited possibilities. Only on the smaller game could it be used with the certainty of a kill. Nevertheless it gave the mounted huntsman a better chance in a long chase of reaching the quarry and slowing him down so that the sword or spear could be brought into play. Lucas Cranach's 1529 painting of *The Stag Hunt of the Elector Frederick the Wise*, in the Kunsthistorisches Museum, Vienna, shows deer being

34. Hunting the Unicorn with a lance. Detail from the thirteenth-century Douce MS. 366, Bodleian Library, Oxford.

chased into a bend of a river on the other side of which are the royal hunters with their crossbows. Horsemen are also engaging the deer, some with the sword and others with long lances.

Stradanus's illustrations of bear hunts, engraved in 1578, show horsemen with lances driving the animals towards netted compounds where huntsmen on foot are despatching the bears with their stout, barred spears. In the same artist's engravings of wolf hunts, however, the horsemen aided by dogs are using their lances for the kill. Titian's famous painting of the Lord of Atri, *c.* 1550, in Kassel, portrays him dressed for the hunt in splendid Renaissance costume of crushed raspberry and gold, holding a lance, the haft of which is covered with material to match. The small leaf-like blade of the lance is of a kind which was in universal use from the Middle Ages until modern times. Whereas by the sixteenth century a definite type of hunting spear had evolved, it cannot be said that any particular form of lance head was designed solely for sport.

There was, however, one form of lance—one must include it in this category because of its proportions—made only for the hunt. This was the chamois and ibex spear. The finest illustration of it occurs in the *Triumph of Maximilian* (Fig. 35). A group of chamois hunters are shown under the command of Conrad Zuberle, who guaranteed to provide his Emperor with the 'merriest ibex and chamois hunting in the world'. Where the merriment came in is hard to see for equipment carried by the hunters indicates the hazards of their calling. Because their work brought them to mountainous areas they wore stout leather shoes and carried crampons for use on icy ground. For tracking across snow they had snow shoes in the form of wooden rings, looking like circular sieves. The slender poles of their spears, between 9 and 12 ft. long, could be used as climbing aids, whilst detachable steel heads or blades were carried stuck in the scabbard of their belt knives. Woodcuts in the *Theuerdank* and the *Weisskunig* illustrate the chamois hunters at work probing the chamois from some precarious position on high rocks or using the spear as a javelin to send it crashing to its death in the valleys below. A skilled chamois hunter could throw his spear some 20–40 yd. It was a form of hunting that seems to have had a special appeal for Maximilian. In a manuscript of 'Secret Instructions for Hunting'

35. The Chamois Hunters. Detail from the *Triumph of Maximilian* (1526). Note that the left-hand hunter carries the blade of his spear in his knife scabbard.

(*Geheimnis Jagdbuch*), drawn up for the benefit of his grandsons Karl and Ferdinand, he advocated spears four *klafters* (more than 20 ft.) long. To keep the spear shafts straight and true they were to be kept in special boxes hung in the organ lofts of churches.[18] An example of this rare spear survives at Schloss Tratzberg, Austria.

Pig Spears

With the increasing use of the flint-lock firearm in the seventeenth century many noblemen were content to indulge in more and

more bizarre methods of mass slaughter (see pp. 272–3), but others preferred to participate in a sport where there was some chance for the animal and some danger for the hunter. Such a sport was boar spearing with lances or light spears. In Velasquez's painting of a boar hunt of Philip IV of Spain, *c.* 1640, now in the National Gallery, London (No. 197), an open space in a forest has been netted off to form an arena into which the boar can be driven. Mounted horsemen pursue the boar with short lances armed with small, pointed blades or double-pronged forks (*horquillas*). Hunt servants guarding the boundaries carry the normal form of boar spear with a broad blade and crossbar.

In 1674 Count Amadeo di Castellamonte published his *La Venaria Reale* in Turin. Although it professes to deal with the hunting of stag, bear, boar, fox, and hare, the information given in the text is meagre and the illustrations were designed mainly as flattering portraits of the royal princes of Savoy with their wives and mistresses. One of the plates, however, is interesting because it shows visitors to the Court, the Elector and Electress of Bavaria, hunting boar with short spears or javelins. The Elector is about to plunge or throw his spear into the boar; the Electress, riding side-saddle and dressed in most unsuitable clothes, holds hers, at the ready, parallel to the ground. The way in which both riders hold their spears is very similar to that adopted by hog hunters in India 200 years later.

The painting by Jakob Philipp Hackert in the Museo di Capodimonte of the boar hunt of Ferdinand IV of Naples, in 1785, illustrates a more formal example of this sport. The hunt took place at Cassano where the boar were driven by dogs over marked-out courses across a level plain. The mounted huntsmen pursued them with short light lances which could be plunged or thrown when the boar was in range. But the absence of cover, the flagged runs, the groups of servants controlling the dogs and the long line of carefully-marshalled spectators show to what artificial levels the hunt had degenerated. It was not long, however, before the same sport, transferred to the dusty, scrub-plagued plains of India, was to be transformed into a dangerous game demanding skill and nerve played with much gusto by the British colonial communities.

Just as fox hunting in England only reached its standing with the decrease in the number of stags in the eighteenth century, so boar spearing or pig-sticking, as practised in India, became recognized only at the beginning of the nineteenth century as a substitute for the pursuit of larger game, like bear. The bear was hunted in India by mounted men armed with a short broad-bladed spear which was thrown like a javelin. Other animals were pursued by hunters with the lance. The Oriental form of lance, used for sport or war, varied in length from 6–10 ft. The shaft of male bamboo was often decorated with lacquer, brocade, or silver and gilt, and was noticeable for its heavy metal butt which had a ball pommel ending in a spike. This acted as a counterweight when the lance was held well back towards the butt to give the maximum reach. The point was usually a small triangular or leaf-shaped blade. Some of the shorter lances, however, had long pointed blades and these were often thrown like javelins.[19]

When the Europeans in India turned their attentions to the wild pigs which swarmed across parts of the country, they used the same tough but light bamboo shaft. The sporting writer, H. A. Leveson, explained the methods of producing these:

> Bamboos for war-spears ought to be cut at the close of the hot season, when the sap is in the roots, and they should be hung from the rafters with a 14 lb. weight fixed at the bottom for some months to dry straight, and season. The natives say that if bamboos are cut at the new moon, they will endure for any length of time; if at full moon, that they will decay in two or three years; and that if cut by daylight, then they will get dry-rot before they can become seasoned.[20]

European pig spears were rarely decorated and were fitted with much simpler types of blades and butts. There were, in the main, two sizes or types of spears.

The long spear was from 7–8 feet long and weighed about 2–3 lb. It was used 'underhand', grasped about two-thirds of the way back from the point, with the knuckles turned downwards and the thumb pointing along the shaft. In this fashion, with the arm hanging loosely at full stretch there was free play for the wrist, elbow, and shoulder. The boar was also kept at a safe distance and the whole impetus of man and horse came behind the thrust. The disadvantage of the long spear, like that of the lance, was its unwieldiness amongst bushes, trees, and long grass.

These snags were avoided by the short spear, which had a stouter shaft, $6\frac{1}{2}$ ft. long, with a lead weight on the butt. This

was used 'overhand'. Grasped near the butt end, with the knuckles to the front and the thumb upwards, it was wielded from the elbow and plunged downwards through the back of the boar in a deadly, perpendicular stroke. Both the type of spear and the action were of some antiquity. They can be seen, for instance, on the Assyrian wall relief of 653–651 B.C. from the North Palace, Nineveh, now in the British Museum (No. 124925/6). Properly employed, the spear, though of relatively light construction, could bring down a powerful animal. In an Indian drawing of *c.* 1840 in the Victoria and Albert Museum (I.S. 311–1952) the

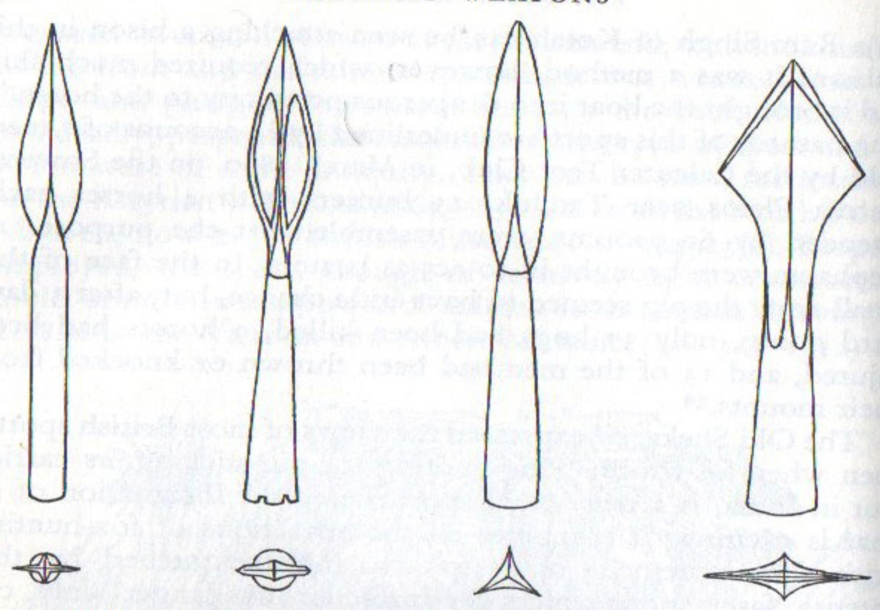
36. Captain Henry Shakespear, the sportsman-writer, on the horse who loved boar hunting and carried him into many an awkward situation. From J. Greenwood's *Wild Sports of the World* (1862).

Raja Ram Singh of Kotah can be seen attacking a bison in this fashion. It was a method, however, which required much skill and it brought the boar into dangerous proximity to the horse.[22] The hazards of this sport are underlined by an account of a meet held by the Calcutta Tent Club, in March 1860, on the Sowerra Burrea Plains near Tamluk. 15 hunters with 4 horses each, attended by 60 grooms, were assembled for the purpose. 11 elephants were brought in to act as beaters. In the face of this small army the pig seemed to have little chance, but, after 3 days hard going, only 37 hogs had been killed, 9 horses had been injured, and 13 of the men had been thrown or knocked from their mounts.[23]

'The Old Shekarry' expressed the views of most British sportsmen when he wrote: 'Hog-hunting, or pig-sticking, as carried out in India, is a truly regal sport, being the incarnation of all that is exciting. It combines all the attractions of fox-hunting with the excitement of steeple-chasing, heightened by that intense fascination which the presence of danger only can inspire.'[24]

Some local preference was shown in the choice of blades for these spears, but there were two main types. There was the *Bodraj* head, the socket ending in a flat, leaf-like blade about 4 in. long. This often had a central reinforcing spine or rib and was made mainly at Aurungabar in Bombay. The other, the bayonet head, was based on the European type of bayonet of the muzzle-loading era and was a three-edged spike, triangular in section, from 5–6 in. long. It was supplied by such London outfitters as Wilkinsons of Pall Mall, Hill of Haymarket, and Thornhill of Bond Street. 'The Old Shekarry' boasted that he could drive a blade made by the last firm through a dollar without turning the edge.[25] A bayonet-head spear in the Tower of London Armouries is stamped with the name of the famous gunmakers Manton & Co. of Calcutta (Fig. 37).

As the hey-day of the pig-spearing sport coincided with the development of the small percussion and cartridge pocket-pistols, it was not long before some sportsmen experimented with the attachment of a pistol to the blade of the spear. These combination spears were certainly more convenient and effective than their predecessors the heavy wheel-lock pistol *cum* boar spears, and the pistols were usually attached so that pressure on the



37. Four types of pig-sticking spearheads. *Left to right*: Bodraj head; Deccan Hunt; Bayonet head; Diamond head. From specimens in the Tower of London Armouries.

point of the blade automatically fired the pistol. Unfortunately a passing branch or bush could just as easily set it off.

Javelins

The throwing spear or javelin, as we now call it, was always a favourite hunting weapon of antiquity. Thin-shafted spears can be seen in hunting scenes on Greek vase paintings (Fig. 38). Roman mosaics in the British Museum[26] show horsemen with short spears with leaf-like or arrow-shaped blades, either using them as a stabbing weapon held 'overhand' near the butt, or throwing them like darts. Dart, in fact, was the English word normally used for these short, light spears. The fifteenth-century manuscripts of Gaston Phoebus include scenes showing horsemen about to throw them at stag or boar. In the Devonshire Hunting Tapestries of *c.* 1425–50 a dart being used against a bear is given a heavy arrow-shaped head and a properly feathered tail. It is very similar to one carried by a knight in the votive panel from the altar piece of St. Lambrecht, by Hans von Tübingen, *c.* 1430, in the Alte Galerie am Landesmuseum

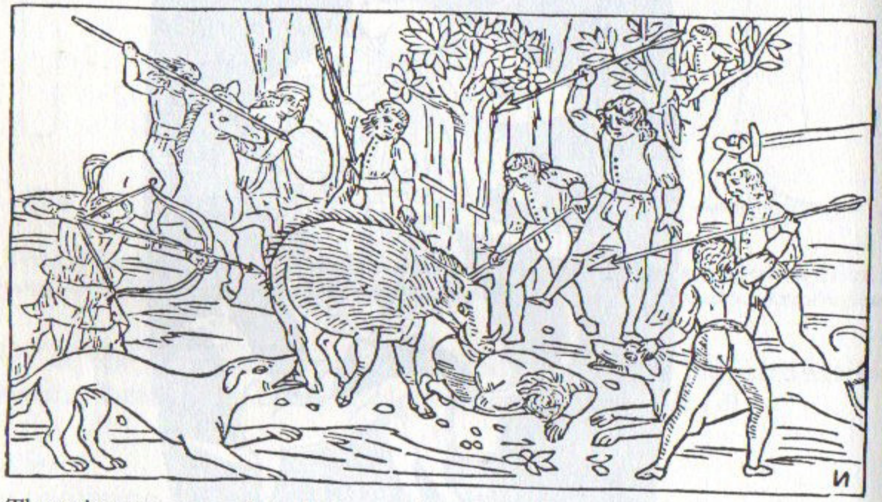
Joanneum, Graz (Inv. No. L 12). The 1509 edition of Ovid's *Metamorphoses* shows arrow-shaped javelins being thrown at a boar (Fig. 39).

As one might expect, Henry VIII, that skilled man-at-arms, was proficient in the use of the dart or javelin. Erasmus noted in 1529, that he (the King) 'had such natural dexterity, that in the ordinary accomplishments of riding and throwing the dart he

38. Greek huntsman with throwing spears held by a loop or *ankulé*. Painting on a *lekythos* (oil vessel) of *c.* 480 B.C. in Boston Museum of Fine Arts.

outstripped every one'. In 1532 Anne Boleyn presented him with 'certain darts Biscayan fashion, richly ornamented'. It was probably these that are listed in the 1547 Inventory as 'Dart heddes, partlie gilt'.[27] Also in his great armoury were various kinds of javelins, mostly for ceremonial bearing. There were also 'topp dartes' which were thrown from the top castles of naval vessels. They appear in some late fifteenth-century inventories as 'Spaynish dartes',[28] and the sport of dart throwing may well have been introduced from the Spanish Court where mounted exercises and games with Moorish darts were popular.

Few European javelins of early date have survived and those that have were probably intended for ceremonial purposes.[29] A late fifteenth-century all-steel dart or javelin in the Real Armeria, Madrid (No. I 95), is undoubtedly a hunting weapon, being like a miniature boar spear complete with crossbar. It is also interesting because it is illustrated in the *Inventario Iluminado*, the Inventory of the armoury of Charles V prepared in *c.* 1540–50 (Fig. 40). Phillip II of Spain commissioned several paintings from the Italian master Titian which had hunting themes. In one of them, *Diana and Callisto*, *c.* 1556 (National Gallery, Edinburgh)

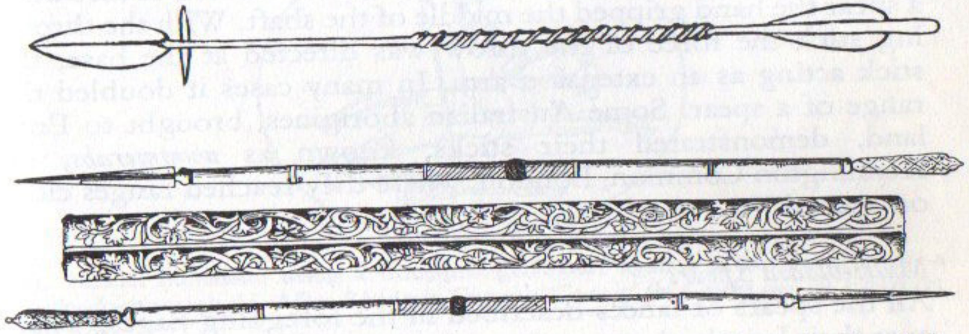


39. Throwing spears or darts being used against a boar. Woodcut from the 1509 Venice edition of Ovid's *Metamorphoses*.

and in an earlier painting by Titian, *Venus and Adonis*, *c.* 1545–6 (Prado, Madrid), the hunting equipment displayed includes a heavy spear dart with a feathered butt.

It was in the East that the art of throwing the javelin was developed to the greatest extent. The French jeweller John Chardin, who travelled in Persia in the 1670s, wrote with admiration: 'There are People in *Persia* so well made, and so Skilful at this Exercise, that they will throw a *Dart* or *Javelin* six or seven hundred Paces.'[30] Although it is not easy to identify an early Persian or Turkish javelin there is no lack of specimens dating from the seventeenth and eighteenth centuries. The *gerid*, *jarid*, *jered*, or *djerid*, as it is called, varied in length from 3–4 ft., the

blade being from 4–7 in. The latter was of triangular or quadrangular section, although flat, lozenge shapes are not unknown. The shafts were usually of wood, with decorated butts of silver; but all-steel javelins were also popular. The latter were made with flattened butts shaped like arrow feathers and were chiselled and pierced with arabesque decoration (Fig. 40). The javelins were normally carried three at a time in a quiver, which had silver mounts to match the caps of the spears. Occasionally one or two javelins were carried with a sword decorated *en suite*. The Japanese javelin, *makura yari*, it may be noted, had the smallest blade of all, a matter of only 2 in.



40. Javelins. *Above*: Spanish dart with crossbar. Drawing from the *Inventario Iluminado*, *c.* 1540–50. *Below*: Pair of Persian steel javelins with case, eighteenth century. Illustrated in Egerton's *Indian and Oriental Armour*, Pl. XV, and now in Tower of London Armouries.

It is often difficult to decide when a javelin becomes a short spear and vice versa. Native spears like the Kaffir *assegai* were often used for both stabbing and throwing. The Kaffir warrior and hunter was one of the most skilful and fastest of spear throwers able to put three spears in the air at the same time. He would first make a light spear vibrate and hum in his hand and then launch it to a distance of 50–70 yd. 'like a slender serpent undulating itself gracefully through the air'.[31] A device which enabled all but the heaviest of spears to be cast a respectable distance was the spear thrower. In its simplest form it was a loop or thong attached to the shaft. It was known to the Greeks as the *ankulé* and to Romans as the *amentum*.[32] The spear was rested in the hand and thrown by the two first fingers hooked through the loop. The natives of New Caledonia, New Guinea, and the

New Hebrides used a similar loop except that it was arranged so that it slipped off the spear on the jerk of release.

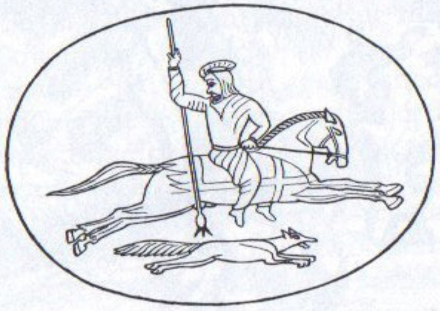
The most efficient of the spear throwers was the throwing stick which was found in Australasia, Central America, and in the Arctic regions where the bow was either unknown or little used because of the paucity of materials. Nearly all these sticks were of wood, between 1½ and 2½ ft. long, and were carved in a variety of shapes. The main principle of the design, however, was a flat board with a grip at one end and a projecting pin at the other. The latter, sometimes a tooth or a piece of bone, was placed at the butt end of the spear which lay along the length of the stick supported by the fingers. In the normal method of throwing a spear the hand gripped the middle of the shaft. With the throwing stick the force of the throw was directed at the base, the stick acting as an extension arm. In many cases it doubled the range of a spear. Some Australian aborigines, brought to England, demonstrated their sticks, known as *wummerahs*, on Kennington Common, London, where they reached ranges close on 100 yd.[33]

Multi-bladed Spears

All the spears or lances described in the foregoing pages, whatever their length, shape, and construction, have relied on a single blade for their effect. From the earliest times, however, it was realized that with a small or elusive quarry it was easier to hit the target with a spear of two or more blades. But the chances of a better aim had to be weighed against the disadvantage of increased weight and a diminution in the manoeuvrability. One of the earliest examples of a multi-bladed spear is the bronze trident in the British Museum (No. 120832), which came from Ur and dates to *c.* 3000 B.C. The classical trident, traditional weapon of Neptune, is always thought of as a fish or eel spear and there is ample evidence of its use as such from an early date. Specimens of tridents have been found on the sites of the prehistoric lake dwellers in Switzerland, bronze ones from the edge of Lake Garda and iron ones from the La Tene site.

The Barberini Mosaic of the first century A.D. in the Museo Nazionale Archaeologico Prenestino, Palestrina, shows a fisherman holding a trident poised to strike. But these multi-bladed spears were not only used against marine creatures. A Persian

seal of the fourth or fifth century B.C. is engraved with the scene of a horseman thrusting at a fox with a three-pronged spear (Fig. 41). Amongst the hunting scenes in the mosaics of the Imperial Villa of Piazza Armerina, laid down in the second century A.D., another horseman armed with a vicious, barbed, two-pronged spear, rides down a hare. Mention has already been made of a similar weapon being used against boar (see under p. 96). In Germany a two-pronged spear, the *Wolfsgabel*, was also popular for wolf hunting. A twelfth-century painting from the



41. Persian huntsman using a three-pronged spear against a fox. Intaglio on a chalcedony scaraboid. After Richter's *Engraved Gems of the Greeks and the Etruscans*, No. 501.

chapel of Berlanga, Castile, now in a private collection in New York, shows a hare hunt in which a mounted hunter is wielding a three-pronged spear.[34]

In the main, however, the multi-bladed spear, which overcame the misleading optical effects due to the refraction of water, was aimed at the denizens of that element. Foremost amongst these was the otter who was hunted down with an astonishing ferocity. Two- or three-pronged spears seemed to have been used with equal asperity. The fifteenth-century manuscripts of Gaston Phoebus, and Stradanus, in his *Venationes* (1630), illustrate three-pronged spears; the Devonshire Hunting Tapestries (*c.* 1425–50), and Richard Blome in his *Gentlemans Recreation* (1686), show two-pronged spears being employed in the otter hunt (Fig. 42) In contemporary hunting literature these spears are rarely mentioned in any detail, but J. W. Carleton in his *Sporting Sketch Book* of 1842 (p. 21) gives this description of an unusual otter spear:

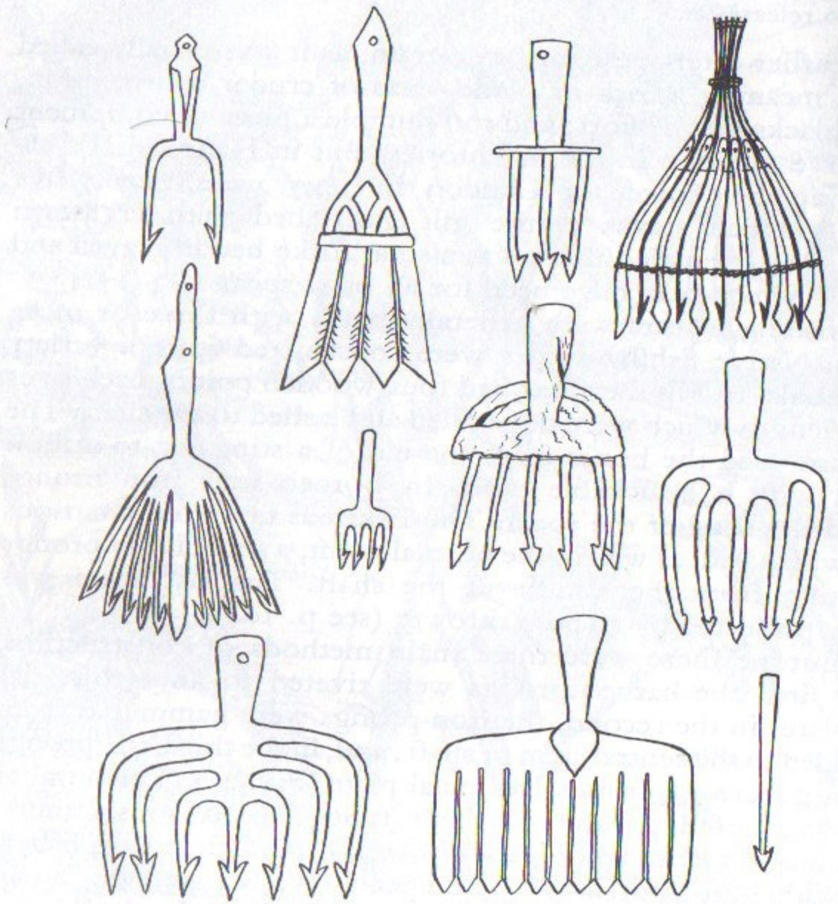
42. Details from the engraving 'Hunting ye Otter' in R. Blome's *The Gentlemans Recreation* (1686).

a long, flexible, ashen pole, but headed with a barb somewhat scientifically constructed. The smaller end of the pole being bored and fitted with a counter sink (a female screw and collar) a spring barb is screwed into it. This barb is so constructed that, being driven into the hide of the quarry, it expands and gives out two hooks, which effectually prevent the hold of the spear being destroyed by any efforts of the animal to release itself.

The earlier otter-spear, or otter-grain, as it was usually called —grain meaning a fork or blade—was of cruder construction, a local blacksmith's effort; and too humble a piece of equipment to deserve mention in the inventories. But in Henry VIII's armoury at the Tower of London in 1547 were twenty-five 'Three grayned staves partlie gilt garnyshed with crymesen velvet'. At Greenwich there was also a 'forke hedde graven and guilte',[35] which may have been for an otter spear.

For fishing, spears were generally made with three or more prongs. Native fishing spears were constructed from a variety of materials. In Fiji the spear had four wooden points, each over 3 ft. in length which were dovetailed and lashed to the shaft. The Tahitians used the bones from the tail of a sting ray to make a trident with a detachable head. In Borneo four iron prongs formed the head of the spear. The Eskimos favoured a curious spear which had, as well as the normal point, a set of ivory prongs projecting from the middle of the shaft. The last spear was usually projected by a spear thrower (see p. 104).

In Europe there were three main methods of construction. In the first, the barbed prongs were riveted to an arrow, flat base plate; in the second, the iron prongs were hammered from or welded to the central stem or shaft; and, in the third, the prongs and base were cut from a flat metal plate (Fig. 43). The number of prongs used in any of these types varied considerably. Stradanus, on Plate 89 of his *Venationes* of 1630, draws his fishermen with four and six-pronged spears. W. Scrope, writing in 1843, describes a salmon spear of five prongs.[36] In the Museo Fioroni at Legnano are the remains of two fishing spears, both with seven prongs.[37] The makers of these spears must have worked on the theory that the more prongs available the less likelihood of a miss and the smaller the fish likely to be caught. In the Judkyn Memorial Collection at Bath, is a spear consisting of one central prong with five hooked prongs on either side.



43. Fish spears, seventeenth to nineteenth century. *Left to right. Top row*: Scottish, two prongs (*National Museum, Edinburgh*); English, four prongs (*Bridewell Museum, Norwich*); Scottish, three prongs (*National Museum*); Danish, eleven prongs (*Copenhagen Collection*). *Middle row*: American, eleven prongs (*Judkyn Memorial Collection, Bath*); Scottish, four prongs (*National Museum*); Italian, seven prongs (one missing) (*Museo Fioroni, Legnano*); Swiss, five prongs (former *Boissonas Collection*). *Bottom row*: Scottish, seven prongs, leister of Patrick Robertson (*Blair Castle, Scotland*); Scottish, eleven prongs (*Blair Castle*); Scottish, single prong (*Stirling Museum*).

This was probably used for eel fishing (Fig. 43). A painting by William Sydney Mount (1807–68) called *Eel Spearing at Setauket*, in the collection of the New York State Historical Association, illustrates a similar spear in use. An unwieldy-looking spear in Blair Castle, Perthshire, has a head of eleven barbed prongs cut out of a flat piece of metal.

The fish or salmon spear was particularly popular in Scotland where it was known by the dialect names of 'leister', 'waster', and the Gaelic '*Muirgheadh*'.[38] A 'clodding leister' was a shorter, heavier spear which was cast rather than thrust, and was attached to a 'lyams' or line. Some fishermen attained great skill with this method and J. Logan, in his *Gaelic Gatherings or The Highlanders at Home* (1848), refers to a man who could kill a salmon nine times out of ten at distances up to 40 yd. Fish spearing or leistering was forbidden in England as early as 1533–4 (25 Hen. VIII, c. vii), in Scotland in 1601 (*Reg. Privy Council* VI, 313), and in Ireland in 1714 (2 Geo. I, c. xxi), but the sport continued clandestinely well into the twentieth century. Sir Walter Scott provides eye-witness accounts in *Guy Mannering* and *Redgauntlet*. In the latter he describes a scene on the banks of the Solway estuary, where, with the tide out and only a stream running, horsemen were hunting the salmon:

> they chased the fish at full gallop, and struck them with their barbed spears, as you see hunters spearing boars in the old tapestry. The salmon, to be sure, take the thing more quietly than the boars; but they are so swift in their own element, that to pursue and strike them is the task of a good horseman, with a quick eye, a determined hand, and full command both of his horse and weapon.

Harpoons

There was at least one fish, or rather mammal, the whale, who did not take the hunter's attentions quietly. The whale was hunted with the spear or harpoon as soon as man was able to construct a boat suitable for the task. Whale fishing in neolithic times must have been very much like that of the Eskimos when Europeans first made contact with them. Both Eskimos and the North-West Coast Indians used harpoons with barbed points of slate, bone, or obsidian, which were sharp enough to penetrate the whale's skin. Fastened to the head of the harpoon—the shaft

was sometimes pulled away—was a sealskin float or buoy. With a number of these attached the whale found it difficult to submerge and it was gradually tired out until it could be attacked

44. Detail from the engraving of 'The Fish Spearers' in Stradanus's *Venationes* (1630).

at close hand with lances and knives. The hunters took care to keep their frail boats and canoes at a safe distance. The natives of the Aleutian and Kurile Islands adopted a safer method. A barbed spear tipped with poison was thrust into the whale and

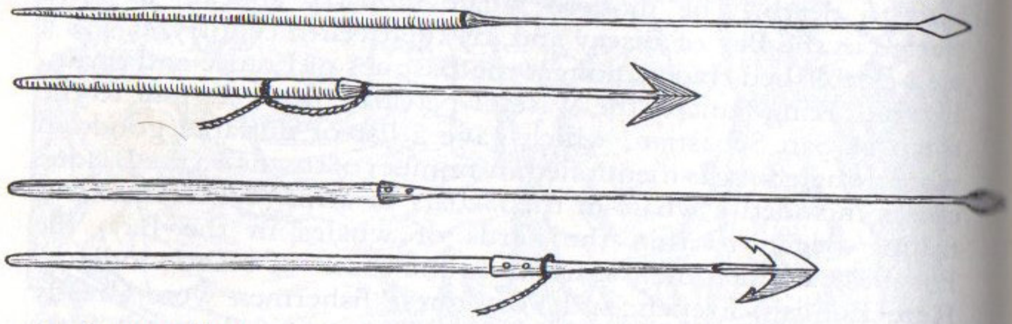
the hunter quickly removed his flimsy craft from the scene leaving the whale to die from the poison and to be picked up as a floating carcass some days later.

With the development of much stronger boats and with the assistance of strong iron spears or harpoons a different technique was evolved in Europe. Once the harpoon had taken a firm hold in the whale every effort was made to keep it tied to the boat by a strong line let out, if necessary, 200–300 fathoms. It was the effort of towing the boats which eventually brought the whale to a state of exhaustion when it could be attacked by lances and bled to death. The modern whale industry appears to have started in the Bay of Biscay and, by the twelfth century, it was a well-established trade amongst the Basques of France and Spain. In 1160, King Sancho the Wise of Navarre, made a grant to the town of San Sebastian, which gave a list of dutiable goods in which whalebone is mentioned. A number of towns on the Basque coasts included a whale in their coats of arms. When intensive fishing began to thin the herds of whales in the Bay, the Basques extended their searches to the coasts of Newfoundland. Here English, French, and Portuguese fishermen were already engaged in fishing for cod, etc. The secrets of the trade were thus spread to the fishermen of nearly every country of north and west Europe, and, by the sixteenth century, they were competing with each other by every means, fair or foul, for the rich prizes that lay within the body of the great mammal. In Hakluyt's *Voyages* of 1575, the whaler was described as a ship of 200 tons with a crew of 55. The equipment recommended consisted of:

15 great javelins
18 small javelins
50 harping irons
3 dozen staves for the harping irons
5 pinnaces
5 men to strike with the harping irons.

The mention of the men who were to do the striking is interesting. Early in the seventeenth century the Muscovy Company of London endeavoured to assert a monopoly over the whaling industry, but other English traders, under cover of a Scottish patent granted to a Nathaniel Edwards in 1626 for fishing off Greenland, set up in opposition. The Muscovy Company appealed

repeatedly to the Privy Council and their main complaint was against their competitors 'hyring away their principall Harpeiners and Whale Killers'.[39] For on the skill of the harpooner, usually a 'Biskaner', depended the fortunes of all. It was a closed, conservative profession and the shortage of trained men continued in the eighteenth century. On 3 March 1731/2 the Court of the South Sea Company in London was informed that seven of its ships waiting to sail for the Davis Strait were detained at Gravesend 'for want of the Dutch Harpooneers, Specksniders, and other officers'.[40] The weapons used changed



45. Lance and harpoon from *(above)* F. Marten, *An Account of several Late Voyages,* etc. (1694) and *(below)* A. H. Markham, *A Whaling Cruise to Baffin's Bay and the Gulf of Boothia* (1874).

very little until the introduction of the harpoon gun (see Chap. 6). The javelin or lance and the harping iron or harpoon illustrated by Marten in 1694[41] differ in only minor details from those pictured by Markham in 1874 (Fig. 45).[42]

The lance, which had a long, socketed iron shaft tipped with a sharp, leaf-like blade and was joined to a short wooden pole, had a total length of 10–15 ft. The harpoon, a descendant of the Roman *pilum* and the Frankish or Merovingian *angon*, had a large barbed head with—to use Marten's words—'two sharp Beards, they are sharp at the edge, and have a broad Back like unto a Hatchet'. Steel was recommended for its construction by some authorities but of not too hard a temper to allow for bending. William Scoresby, the great English whaling captain, did not agree. He spoke of the shank of the harpoon as follows:

As this part is liable to be forcibly and suddenly extended, twisted and bent, it requires to be made of the softest and most pliable iron. . . .

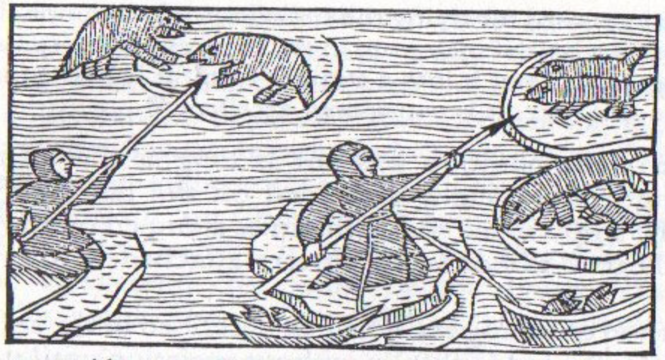
A test sometimes used for trying the sufficiency of a harpoon, is to wind its shank round a bolt of inch iron, in the form of a close spiral, then to unwind it again, and put it into a straight form. If it bears this without injury in the *cold* state, it is considered excellent.[43]

The shank of the harpoon was not as long as that of the lance and its length and weight depended on the fancy of the harpooner. The ship's name was sometimes stamped on the harpoon and sweethearts' ribbons and garters attached to the rope for luck.[44]

The method of killing the whale as described in the seventeenth century was followed faithfully without variation until the middle of the nineteenth century. When the whale was sighted, the pinnaces or shallops were lowered from the mother ship, each boat being crewed by a harpooner, a steersman and four to six oars. The shallop was then quietly manoeuvred within striking distance. What followed is best left to the words of a seventeenth-century writer, Samuel Purchas:

the Harponyre, who standeth up in the head of the Boat, darteth his Harping-iron at the Whale with both his hands, so soone as he commeth within his reach: wher-with the Whale being strucken, presently descendeth to the bottome, and therefore doe they reare out a rope of two hundred fathome, which is fastned to the Harping-iron, and lieth coyled in the Boat; And they let him haue as much of the rope as reacheth to the bottome, and when they perceiue him rising they hale in the rope to get neere him, and when the Whale commeth up aboue water, then do the men Lance him with their lances, either out of one Shallop or the other; for most commonly there bee two Shallops about the killing of one Whale. In lancing him they strike neere to the finnes he swimmeth withall, and as lowe under the water neere his bellie as conueniently they can. . . . The Whale hauing receiued his deadly wound, then he spouteth bloud (whereas formerly he cast forth water) and his strength beginneth to fayle him; but before he dieth hee will sometimes draw the Shallop three or foure miles from the place where he was first stricken:[45]

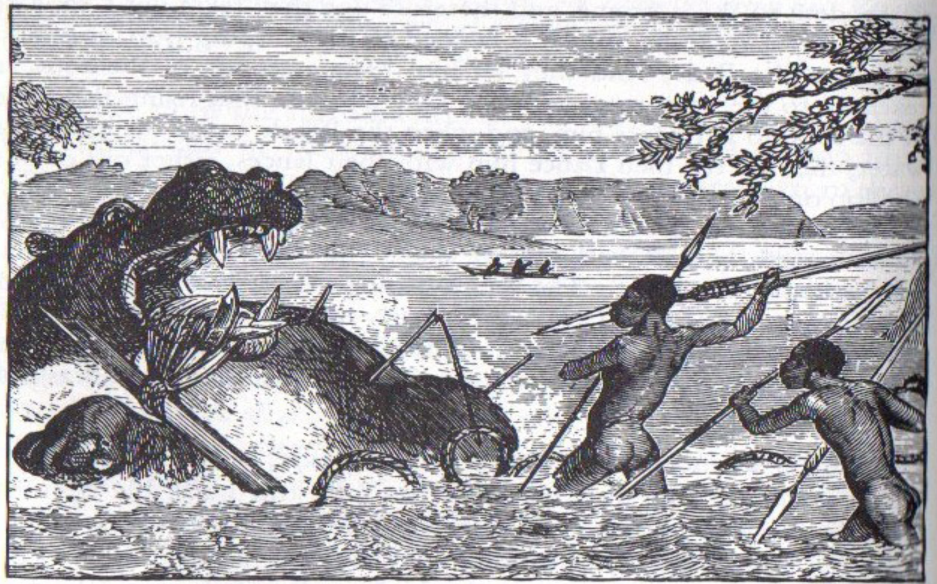
Purchas warned his readers that the whale, in its death throes, often smashed the shallops with his tail, and gave his opinion that 'swimming is also requisite for a Whale-Killer to be expert in . . .'. The walrus, seal, and sometimes the polar bear were hunted down with similar methods. In spite of the introduction of the gun harpoon, bomb lances, and motor vessels, the old



46. Seal hunters with spears. From Magnus's *Historia de Gentibus* (1555).

traditional method of whale hunting with hand harpoons and rowing boats is still practised in the Azores.

Finally there was one other beast which attracted the attention of the harpooner, the hippopotamus. Until recently some natives of Central Africa hunted this inhabitant of rivers and lakes with much the same techniques adopted by Egyptian hunters on the Nile 3,000 years before them. The harpoon used had a shaft the size of a scaffold pole, some 10–12 ft. long. A



47. Spearing a hippopotamus after it has been harpooned (note the rope entangled in its teeth). From J. G. Wood's *Man and his Handiwork* (1886).

barbed iron point was inserted loosely in a socket at one end and fastened by a large number of loose strands. The other end of the harpoon was attached to a stout rope. The hippopotamus was attacked from a boat as though it were a whale. Even if it shook off the heavy pole from its barb, it could not bite through all the strands which held it. With its movements thus impeded it generally tired until it could be towed into the bank of the river and finished off with spears (Fig. 47). The Hamran Arabs used a different sort of harpoon, the barb being fitted to a light bamboo shaft which could be thrown single-handed. The barb in this case, was attached to a light wooden float in similar fashion to the sealskin float of the Eskimos. As the wounded animal rushed through the water the float betrayed his position. Other harpoons were attached to it until it was exhausted.[46]

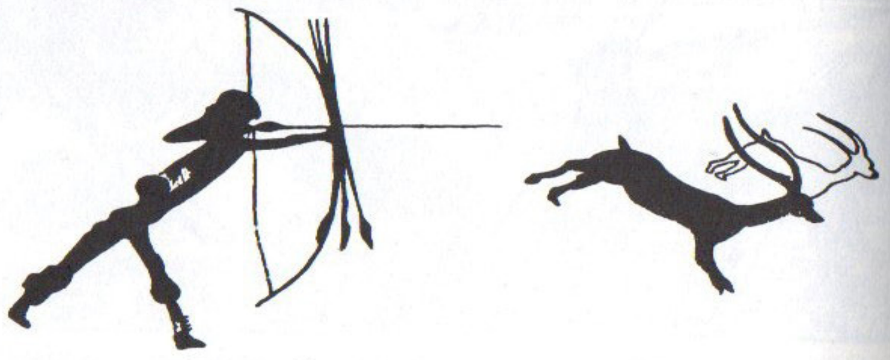
If the hippopotamus sought the safety of land it faced the perils of the trap. This was a 4–5 ft. wooden beam, armed with a spike or spear head, and suspended by a cord over a path frequented by hippopotami. The end of the cord was brought down and arranged as a trip, which when released by the animal, caused the spear to fall and penetrate the animal's back. These heavy spears were often weighted with stones and were sometimes used against elephants.

Chapter Four

Bows

The Bow in Antiquity

Although no bows have been found which can be positively identified with the remains of Paleolithic man, there seems to be little doubt from the evidence of numerous stone arrowheads and other artifacts that the history of the bow can be traced back to that period. From Neolithic times not only are there the rock paintings of the Iberian Peninsula, such as those in the caves of the Valltorta Gorge, showing men with bows and arrows hunting deer (Fig. 48), but actual examples of bows have been recovered from the lake shore sites of Switzerland.[1] Nearly all these were plain staves made of yew between 5–7 ft. long (in their original state); a length which enables a bow to be made thick enough to be bent acutely without fracture. These bows were the forerunners of the famous long-bows of the Middle Ages.



48. Prehistoric cave-painting in Valltorta Gorge, Spain.

From the construction point of view when bows are made entirely of wood in this fashion they are known in modern archery terminology as self-bows.

Neolithic rock carvings at Salawruga on the White Sea show hunters using much shorter bows, apparently about 3 ft. long. A large number of bows dating from the Neolithic period and averaging 40 in. in length have, in fact, been found in Asiatic Russia, particularly in the district to the west and north-west of Lake Baikal. They appear to have been constructed of wood reinforced on the inside or belly with laths of antler horn. Other Neolithic bows show signs of having been strapped or laced with strips of sinew to prevent the wood from breaking and to give it greater elasticity. In these early examples of short bows we have the beginnings of what was to be known as the composite bow. Its main constituents were horn, a compressible material to strengthen the belly; wood, a stiffener for the centre of the limbs and for the ends or ears of the bow; and sinews, to act as a stretchable but elastic backing.

Whilst at first the horn and sinew were probably tied or lashed to the wood to achieve their purpose, when the manufacture of a strong fish glue was perfected, then the three materials were cemented into one strong lamination which was properly shaped and carved with two nocks on to which the bowstring was fitted. A covering of birch bark or skin helped to preserve it from excessive heat or damp. An Arab archer of *c.* 1500 wrote:

> Just as man is made of four component parts (bone, flesh, arteries, and blood) so is the bow made of four component parts. The wood in the bow corresponds to the skeleton in man, the horn to the flesh, the sinews to the arteries, and the glue to the blood. Similarly a human being has a belly and a back, and so has a bow. And just as a man can bend inward upon his belly without any harm, but may be injured if he bends outwards upon his back, so it is with a bow. It can be bent inward upon its belly but will break if it be bent upon its back.[2]

It was not a very good comparison because the composite bow could be bent both ways. In order to increase its strength or return pull, the limbs of the bows were constructed deliberately so as to curve back away from the holder when the string was removed. This reflex curve, which is still apparent when the bow is

braced (i.e. the string fitted), is a characteristic sign of the composite bow. The early development of the bow was not confined to the barren North. In the warmer and more populated lands of Egypt and Mesopotamia ample archaeological evidence is to be found of the use of both plain wood and composite bows. The Egyptian 'Hunters Palette', the carved slate tablet of *c.* 3500 B.C. in the British Museum (No. 20792), has carvings of hunters shooting with bows whose ends turn in sharply to the string, in an outline which has given this type of bow the classification of 'double-convex'. The difficulty with all these Egyptian and Assyrian representations of archers is to decide how far one can accept the artist's or sculptor's often casual delineation of a bow as an accurate picture and a guide to the method of its construction. Although the normal curve of a drawn self-bow is a segment, examples of Egyptian bows made of acacia wood which have been preserved, have whippy ends slightly curved inwards in their unstrung state, so that the double-concave bows of the Hunters Palette which also figure prominently in sculptures and paintings from *c.* 2000–1500 B.C. were probably all plain wooden ones.

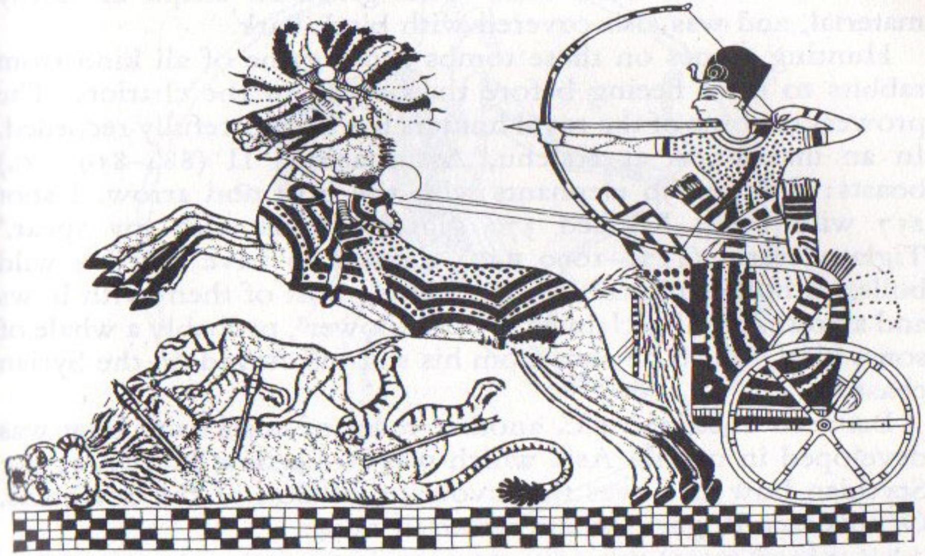
From *c.* 1500 B.C. onwards, however, another type of bow makes its appearance. This is the so-called 'triangular bow', built in the shape of a shallow isosceles triangle, with the arms meeting sharply at the grip at an angle of 120°. A plain wooden bow made in this way would be so weakened at the grip as to be liable to break at any strong pull. Some form of reinforcement had to be applied to the wood. Reliefs on the side of a chariot found in the tomb of King Thutmose IV (1411–1397 B.C.)[3] show both this type of bow and the segment bow being used by the soldiers of Egypt, Syria, and Palestine. The ends of the segment bows are slightly recurved so that there seems little doubt that by this period the majority of both types of bows were of composite construction.

One of the difficulties from the Egyptian point of view was to find the necessary materials to make the composite bows. An interesting document in the Ugarit itemises these:

> let me vow *tqbm* (birch tree?) from Lebanon
> Let me vow tendons from wild bulls
> Let me vow horns from wild goats
> Sinews from the locks of bulls.[4]

The suggestion has been made that Egyptian composite bows were all imported, but there is, in fact, a painting of a bow factory taken from the fifteenth-century B.C. Tomb of Menkheperra'sonb at Thebes, and a sculpture in relief from the Tomb of Puimoe of the same date which give clear pictures of composite bows in the course of manufacture.

The richest source of information about the methods of hunting of this time are the paintings showing kings and their officials hunting with bow and arrow from their chariots.



49. Detail from the painting on a wooden chest found in Tutankhamen's tomb, Thebes, of *c.* 1350 B.C. The curious position of the bow and the string is due to the artist following the tradition that the face of the subject must not be obscured or marred.

The famous painting on the lid of a wooden chest found in the Tomb of Tutankhamen (*c.* 1350 B.C.) shows the royal archer standing in his chariot with the reins around his waist so that his hands are free to operate a powerful composite bow. The chariot is equipped with a bow case and quivers for the arrows (Fig. 49). In Tutankhamen's tomb were found a number of bows with his name written on them. Although analysis of these bows is difficult because the horn or sinew constituents have become hydrolysed into a gelatinous substance, enough remains to show

that they were composite bows of an angular profile covered with a birch-like bark.[5] If the paintings and reliefs on the tomb are correct then he used the same arrows, with spear-shaped heads against fowl, lions, and ostriches. The lower half of his left arm was covered with a leather guard or 'bracer' as a protection against the blow of the string. Another composite bow was found in the Tomb of Amenhotep II (1436–1411 B.C.), the great warrior king who claimed to be able to draw a bow which none of his soldiers could use. This bow had a nucleus of unidentified hard-wood backed on both sides with glued-on strips of horny material, and was also covered with birch bark.

Hunting scenes on these tombs show game of all kind from rabbits to lions fleeing before the onrush of the chariots. The prowess of some of the royal hunters has been carefully recorded. In an inscription at Kalchu, Assurnasirpal II (884–859 B.C.) boasts: 'I killed 30 elephants with the bow and arrow. I shot 257 wild bulls, I killed 370 gigantic lions with my spear.' Tiglatpileser I (1170–1090 B.C.) claimed to have killed 4 wild bulls, 10 bull elephants, and 920 lions, most of them with bows and arrows. He also claimed a 'nose-blower', probably a whale of some kind, which he shot from his ship off Arvad on the Syrian coast.[6]

Between 1000–500 B.C. another form of composite bow was developed in central Asia which was to become known as the Scythian bow as it was the favourite weapon of the Scythians. Of this race Roger Ascham wrote in 1544:

> The people of Scythia, of all other men loued and vsed moost shotyng, the hole rychesse and househoulde stuffe of a man in Scythia, was a yocke of oxen, a plough, his nagge and his dogge, his bowe and his quiuer: which quiuer was couered with the skynne of a man, whiche he toke or slewe fyrste in battayle.[7]

Their bow was a short one with well-curved limbs which dipped into the handle and curled back at the ends or ears. With the fall of the Assyrian Empire the angular bow fell into disuse and the Scythian bow spread westward through Persia to Greece and Italy. It was the classical bow, described by Homer in the *Iliad* and the *Odyssey*, and carried far and wide by the Greek armies and colonists. Fortunately they have left us with a record of its capabilities. An inscription of the third century B.C. at Olbia

states: 'I say that the famous Anaxagoras, son of Demagoras shot 282 *orguias*.' Taking an *orguia* to be the equivalent of a fathom this works out at approximately 564 yd. (516 m.).[8] The bow can be seen in action in paintings on Greek pottery (Fig. 50).

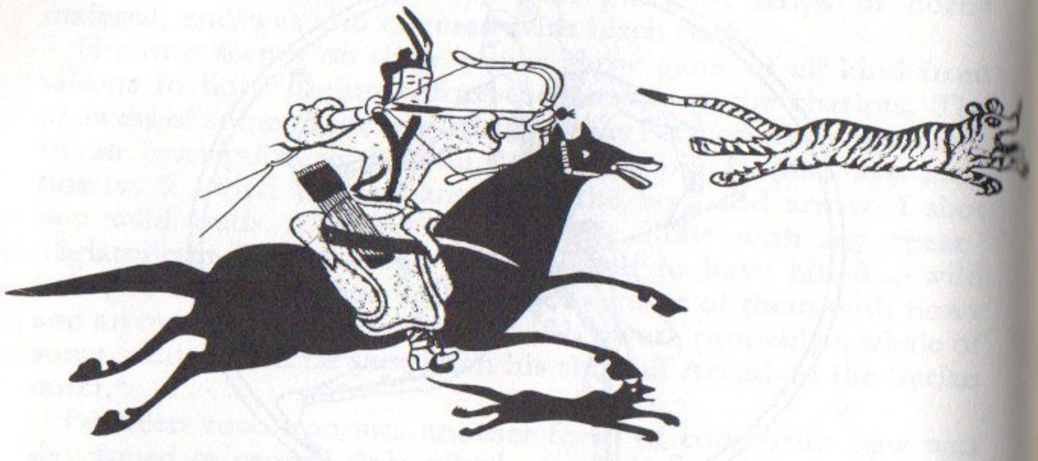
As these short bows became more powerful they became more difficult to string and to shoot. In the eastern part of central Asia yet another form of composite now developed. The ends or ears of the limbs of the bow were straightened and

50. Scythian archer. A painting by EPIKTETOS on a plate (*pinax*) found at Vulci. Attic, *c.* 520 B.C. (British Museum).

stiffened with bone laths. These long ears acted, in effect, like levers, the resultant longer draw easing the effort of overcoming the pull of the sinews and the resistance of the horn. This form of bow became the predominant weapon of central Asia, spreading into China in the east, Turkey to the west and India to the south. A wall painting of the fifth to sixth century A.D. in the 'Tomb of the Dancing Figures' at T'ung-kou, Manchuria, includes hunting scenes in which mounted archers with these bows pursue tiger and deer (Fig. 51). A number of Sassanian silver bowls are embossed with hunting scenes which show clearly this type of bow with its long stiff ears. On a bowl in the Metropolitan

Museum of Art, New York, King Peroz (A.D. 457/9–484) is portrayed shooting at Argali bucks or mouflons. The hunter, his horse, and the sheep are picked out in high relief and gilded, black niello being used to detail the hooves of the horse and the horns of the sheep. It is significant that whilst the ears of the bow are gilt the limbs are blackened.[9]

The peoples of eastern Europe were to experience repeated invasions by Asiatic nomads armed with the central Asiatic composite bow or with similar types derived from it. First



51. Manchurian archer with composite bow. From a wall-painting in the Tomb of the Dancing Figures, T'ung-Kou, Manchuria, fifth–sixth century A.D.

came the Huns conquering kingdom after kingdom with their fast, mounted archers until one of their leaders, Tan-Hu, was able to write: 'thus all peoples which draw the bow have been united into one single family'.[10] After the Huns came the Avars with bows whose ears were bent forward to give a longer draw and were strongly reinforced with bone laths. The grip was strengthened in the same way. Still later appeared the Magyars with much longer and straighter bows. When the Turks arrived to conduct the last onslaught against the Christian world they brought with them another form of composite bow.

The Asian Composite Bow

The Turkish bow, developed from the central Asiatic type, was essentially a horseman's weapon. It gradually decreased in size

so that at the time of the Turkish invasion of Asia Minor and east Europe it rarely exceeded 48 in. and generally averaged 40 in. in length. To achieve this without loss of power, the ears were shortened and the grip was no longer sunk in. The result was a short bow of superb power and elasticity. Turkish archery reached the zenith of its development during the years 1451–1566, covering the reigns of the Sultans from Mohammed II to Suleiman the Magnificent. Whereas the western firearm quickly rose to power after this date the eastern firearm made little progress and, up to the end of the seventeenth century, the Turkish arrow was more effective than the musket ball.

The craft and practise of archery was revived by Mahmud II (1808–39) and, with his encouragement, Mustafa Kani published his *Telchis resail er-rümat* (Excerpts from the Writings of the Archers) in Constantinople in 1847.[11] It is from this detailed account that we get some idea of the complexity of the manufacture and use of bows in just one region of the East. This form of composite bow was taken by the Arab races along the northern shores of Africa into Spain, and by the Persians into India. All three races of bowmakers, the Turks, the Arabs, and the Persians, whilst contributing their own theories and ideas of construction worked to the same basic principles, so that it is often very difficult to distinguish an Arab bow from a Turkish one and a Turkish one from a Persian. As a general rule the Arab and Turkish bows have smaller ears and the grip is not sunk in as on the Indo-Persian type. In their unstrung state the latter are more reflex, the ears sometimes meeting or crossing. But, as will be seen, within each national group, the bow differed in construction according to the climatic region and in form according to the purpose for which it was made.

One of the earliest works on Oriental archery is the manuscript *Tabsirat . . .* written by Mardī ibn Alī al-Tarsūsī in collaboration with the Master Armourer of Alexandria, for the library of Saladdin in *c.* 1180.[12] Mardī divides bows into wooden or non-composite bows and composite bows (Arab and Persian), and differentiates between hand bows (*qaws al-yad*) and foot bows or crossbows (*qaws al-riğl*). A Mameluke manuscript by Taybughā al-Baklamishī al-Yunānī of *c.* 1368 in the British Museum (Add. MS. 23489)[13] and an Arab manuscript of *c.* 1500 in Princeton

University Library by an unknown Moroccan archer adopt roughly the same classification.[14]

The Moroccan scribe elaborated by saying that the wooden bows used by the Bedouins of the Hijaz were made from *nab*, *shiryān*, or *shawhat* wood in single staves or from two staves divided lengthwise. In the non-composite groups he included bows which were reinforced with horn and sinew strips, presumably bound to the central wooden core. The true composite bow in his eyes—many modern authorities are of the same opinion—was one in which the horn and sinew were processed and glued to the wood. He adds an interesting comment on the need for varying the proportion of the three materials:

> The construction of the bow varies, too, in the prevalence of some of its parts over the others as a result of different climatic conditions. Thus, in regions extremely hot or extremely cold, as well as in places which are very damp and humid, the suitable bows are those which have abundant wood and wide limbs; whereas in regions of moderate heat, cold, and humidity, the suitable bows are those which have an abundance of sinew and narrow limbs. The latter are also suitable for use in moderate seasons, such as the spring. In regions the climate of which tends to be cold and damp, like Syria and Andalusia, the suitable bows are those which are scant in wood, abundant in horn, and moderate in sinew and glue.[15]

According to him the Persian and Turkish bows differed only from the Arab bows in that their ears or *siyahs* were longer The slow and patient task of constructing a composite bow is described in detail by Mustafa Kani.[16] The foundation of the bow, the wooden core, was made from maple, preferably grown in the shade and in the vicinity of Kastamuni. It had to be cut in the right season so that 'the worm does not gnaw it'. The horn strips were sawn from the pure black horn of the carabao or water buffalo. The sinew came from the achilles tendons of cattle, which were dried, scraped, and combed into fibres. They were then moulded with glue, also prepared from tendons, into a homogenous sheath for the back of the bow. Some bowmakers preferred fish glue made from the skin taken from the roof of the mouth of the Danube sturgeon.

The wooden core was made in three pieces fishtail-jointed together. Once the horn plates had been glued to the belly of the bow, the bow was gradually bent back into an exaggerated reflex shape or recurvature (*ta-jīr*), whilst the sinew was applied in stages. The composition was carefully heated during each process. When the bow was finally strung its curve was adjusted with the aid of a notched tiller and boxwood formers known as *tepeliks*. The Mameluke archer Taybughā laid down the seasons when these operations were to be carried out. Autumn was to be devoted to the carving of the wooden core and the horn strips. Winter was the season for the binding and reflexing. At the beginning of spring the sinew was applied and the bending processes continued throughout the summer.[17] On the skill with which all this was done depended the power and stability of the bow. The moisture content of the finished bow was a matter of some concern as we have seen from the remarks of the Moroccan expert. In this respect Kani divided bows into two general classes; the *timarli*, those which needed conditioning or drying before use, and the *timarsyz*, which were useable at all times, and were normally covered with leather.

Early archery authorities list bows according to the purpose for which they were made; the war bow, strong but without too much recurvature so that it could be easily restrung; the target bow, longer than the others and capable of a flat trajectory at short range; the shorter flight bow, designed for distance shooting when accuracy was not essential, and various practise bows by which the muscles and reflexes of the archer were exercised. No description is given of a hunting bow.

Both the Persians and the Turks used devices by which the arrow of normal length could be discharged by a bow with a longer draw or, alternatively, a much shorter arrow could be used in the normal span. The word *majrā* or *mijrāt* was used to describe a grooved stick or wooden trough about twice the thickness of an arrow and some 3 in. longer than the normal arrow. With a short arrow lying in its trough it was held and shot in the normal way, but, being connected to the bowstring or tied to a finger of the right hand by a short cord, it travelled only a short distance before being pulled up with a jerk allowing its arrow to speed on its way unimpeded. Taybughā describes different forms of *majrā* but the basic principles of them all was the same—that of a captive arrow acting as a carrier for a smaller missile.[18]

It is probably a bow using this device which is described in the

Persian manuscript *Hidāyat-alrāmī* (the Archer's Guide) which Muhammad Budhaī compiled for the King of Bengal in *c.* 1500.[19] As with all these old Oriental documents, it is difficult to translate the technical words and then to interpret their meaning, but Budhaī's bow, the *nāwak-kamān*, is apparently a bow using a *majrā*. He describes it as a bow for old men who could no longer use the common bow and arrow and mentions its nickname, *dastmāya*, 'the old man's friend'. The Moroccan manuscript says much the same: 'The Persians, accordingly, for the use of old men and youngsters who were unable to effect the long and hard draws resulting from the very long arrows, evolved shooting with the *husbān* and *dawdar* arrows [through the *majrā*].'[20]

The Turkish device, the *siper*, was entirely different, although it served a similar purpose. It was a trough about 6 in. long, made of horn, wood, or ivory, sometimes lined with leather, which was strapped to the bow hand so that it was positioned on the right-hand side of the bow. This trough extended back towards the archer and an arrow of normal length could be drawn as much as 3 in. within the bow.[21]

To the user of the composite bow perhaps the most important accessory was the thumb-ring. With the long-bow and some of the native bows the bowstring could be pulled back either with two or three fingers looped round it or by being pinched between the fingers and the thumb. With the shorter and more powerful pull of the composite bow a more positive grip or lock was needed. This was achieved by hooking the thumb round the string and locking the bent thumb in position with one of the fingers. Morse has called this grip the Mongolian release.[22] The Moroccan manuscript describes six variations of the Mongolian release and also different Turkish and Greek holds. The thumb-ring (Persian *kustubān*, Arab *khayta'ah*, and Turkish *zih-gir*) could be made of gold, silver, copper, iron, jade, chalcedony, ivory, horn, or leather. The last material offered the best accuracy and many thumb-rings made of other materials had a leather lining with a protruding flap called a *kulak*. But the Moroccan manuscript advised: 'know, too, that the archer who uses an iron or copper, or silver, or gold thumb-tip will, all else being equal, outshoot the one who uses a leather thumb-tip.'[23]

Sir John Chardin describing Persian archers in the seventeenth century wrote:

they wear a Ring on their Thumb, an Inch wide within, and half as much without, upon which the Cord or String of the Bow bears: This Ring is made of Horn or Ivory, or of *Jadde*, which is a sort of Green Alabaster: The King has one of hard Bone and light, its natural Colours being Red and Yellow, which grows, as they say, like a Tuft upon the Head of a great Bird in the Isle of *Ceylon*.[24]

Little is known about the identification of thumb-rings and their dating is uncertain. All that can be said is that the near Eastern and Indo-Persian type have a flared side which gives them the appearance, in profile, of the peak of a cap (Fig. 57). Rings made of jade and set with jewels were intended to be worn as ornaments only. The portrait of Selim the Sot, in the Portrait Gallery, Topkapi, shows him wearing such a ring on his right hand. The good archer always carried his thumb-ring suspended in a special box from his belt. Another curious implement carried was the *gosha-gir* which was employed to straighten warped bow-tips.[25]

Apart from the various methods of locking the bowstring during the draw, the techniques of the actual draw and release were equally complicated. Mardī lists fifteen fundamental and six secondary techniques. Then there were special drills for mounted archers, stationary or galloping, shooting to the rear, shooting when holding a shield or sword, shooting with two bows, and so on. On hunting, the following advice for shooting lions was given by the Moroccan author:

One should not attempt to shoot a lion except from the back of a trained and reliable mount, agile in its forward and backward movements. Its tail should either be well combed or, what is still better, shaved—in order to avoid the possibility of having the lion plant his claws therein. If the lion should attack you, toss at him some shawl or garment. He will be busied therewith and you will be able to move away from him a distance of about one hundred cubits, dependent upon the speed of your mount. Then turn around and shoot. If he should rush toward you again, run before him zigzag fashion. This makes it difficult for the lion to overtake you. If he starts to fall back, turn around from a distance of about seventy cubits and shoot. If he tries to assault you for a third time, continue to run away from him, zigzag fashion until he is tired and worn out. You then approach him as near as possible, dependent upon the degree of his fatigue, and shoot. Even then you should be on the alert, never trusting him until you have actually riddled him with your arrows.

Some maintain that a lion will never rush against a hunter so long as his tail remains hoisted upwards. Only when he lowers his tail does he attack.

Others suggest that a manacle made of hair and saturated with tar should be tossed at the lion when he is furious and therefore suspicious. He is apt to take it up with his claws, which will then become entangled therein. Thereupon, shoot, and with God's good luck you will succeed.[26]

The method of shooting to the rear was the favourite technique of Persian and Arab archers (Fig. 52), but it was only achieved

52. Persian archer shooting to the rear. From a seventeenth-century MS. illustrated in d'Olenines *Essai sur le Costume et les Armes des Gladiateurs* (1882).

after considerable practice. One method of practising for a lion hunt was to gallop a horse over soft ground, rapidly discharging arrows into the hoofmarks left behind it. These represented the lion bounding in pursuit of the hunter.

The Moroccan gave this advice for shooting birds on the wing:

Birds are either fast flying or slow flying. To shoot the fast flying birds, like pigeons and martins, other than accidentally is practically impossible. It is a fruitless effort, based on no principle. But the shooting of slow birds with wings outstretched, like storks, eagles, vultures and the like, is a possible pursuit based on definite principles which may be mastered after painstaking practise as prescribed by experts. This is

performed as follows: Take two long posts, as tall as you can find and stick them in the earth about twenty cubits apart. String a line between them and fasten to it a flat object about the size of a bird. Then mount your horse with your bow ready in your hand, and as you approach a point exactly below the line, lean your head over your shoulder, take aim, draw, and shoot. All this should be done while the horse is on the run. When you have mastered this stunt you should be able to shoot the flying bird, since this method provides shooting while the archer is on the move and the target is still and stationary, whereas in shooting the flying bird, the reverse is the case; the archer is still and stationary while the target is on the move. If you possess no mount, practice the same operation while running on foot; and if you should happen to be averse to running because of the effort, practise by shooting directly at the flying bird until you have mastered the stunt. If the bird be a stork, an eagle, or a vulture—birds the wings of which are usually outstretched—aim at the tip of its beak, draw quickly, and release without any pause. If it be one of the birds the wings of which are not usually outstretched, or a bird which is neither slow nor fast in its flight, like the crane or a crow, aim at a point about one cubit in front of its beak, draw quickly and release without any pause. Even then there is no guarantee of uniform accuracy, because the wings often interfere with the flight of the arrow.[27]

Birds and small game could also be brought down by adapting the *majrā* so that it discharged shot. This was done simply by attaching a small coned holder or cylindrical ejector (*midfa mudawwar*) to its head.

Another method employed in hunting flocks of small birds was the use of the 'sideways arrow'. This arrow was usually featherless but with a bulbous nock, and, although it left the bow in the usual way with the arrowhead pointing towards the target, it soon began to loose its equilibrium and to rotate laterally. The Sind archers of India used this method, holding the bow horizontally and helping to start the spin by placing the arrow on the string at an angle so that it received a sideways thrust from the beginning. From the Arab point of view there was a snag for, as the Moroccan manuscript pointed out: 'Birds which have been killed in this manner are unlawful to eat, since they have, in effect, been beaten to death. Those which have been hit by the arrowhead, however, and the mention of the name of God having preceded the shot, are lawful to eat.'[28]

The Turkish, Persian, and Russian hunter on horseback was

an impressive sight. On his left side hung his bow case and sword, and on the other side the quiver. The bow case was shaped to fit just over half the bow and, together with the cylindrical or rectangular quiver, was covered with matching embroidered material or sometimes leather with brass or silver-gilt decoration. One of the finest examples of a bow case is the silver-gilt case of Georg Ujlaki of Sárközuijlak, dated 1627, now in the Badisches Landesmuseum, Karlsruhe. One decorative item seen on quivers in Persian paintings of the fourteenth to the sixteenth centuries is the tail of the snow leopard which is sometimes entwined through the protruding heads of the arrows. The quivers often have an outside pocket apparently for special arrows or a stick-like implement.[29]

The extraordinary accuracy in shooting which the Turks displayed never failed to impress the European visitor. The Flemish diplomat De Busbecq, Ambassador at Constantinople from 1554–62, gave this description in his memoirs:

> The *Turks* are wondrous experts at Shooting at the Bow; they accustom themselves to bend them from 7 or 8, to 18 or 20 Years of Age, and hereby their Arms grow stronger and their Skill so great, that they will hit the smallest Mark with their Arrows. Their Bows are not much stronger than ours, but for their shortness much more tractable; they are not made of single Wood, but of a String and Ox's Horn, fastned together with much Glew and Flax. These sort of Bows, tho' never so strong, the *Turks*, who are used to the Sport, can easily draw even to their very Ear; and yet one that is not accustom'd thereto, tho' never so strong a Man, cannot draw to that heighth.... They aim their Arrows so sure, that in a Fight they will hit a Man's very Eye, or any other part they design to strike. In the place where they Exercise you may see them direct, by their stroke so artificially, that 5 or 6 of their Arrows will stick round about the White in the Butt, (which is usually less than a Dollar) and yet not hurt or touch it.[30]

One of their greatest skills lay in flight or distance shooting. On a piece of ground on the outskirts of Constantinople known as the *OK Meidan* (The Place of Arrows) some fantastic feats of shooting were accomplished and commemorated with inscribed stone pillars. The distances were measured in *gez*, approximately the length of the Turkish arrow which averaged 25 in. Here, in 1798, using special arrows and with the aid of the *siper*, the Sultan Selim III is recorded as having shot an arrow 972 yd. in

53. The Emperor Maximilian I shooting with the composite bow. Detail from *Der Weisskunig* (1526).

the presence of the English Ambassador, Sir Robert Ainslie. Distances between 600–800 yd. were common. One has to accept these distances with a certain amount of reserve but certainly, in 1794, the Secretary to the Turkish Ambassador in London, who admitted to being only a fair shot, reached the distance of 482 yd. in the presence of trustworthy witnesses.[31] Sir Ralph Payne-Gallwey who conducted a series of experiments with Turkish bows reached 421 yd.[32]

With such performances as a recommendation it is not surprising that in many east European countries, especially those who had some contact with the Turkish forces like Austria, Germany, Hungary, and Poland, the inhabitants adopted the Turkish-style bow and arrow. A woodcut by Leonhard Beck in the *Weisskunig* shows the Emperor Maximilian I on horseback shooting with a Turkish composite bow (Fig. 53). In woodcuts such as *The Martyrdom of St. Sebastian*, *The Four Riders of the Apocalypse*, and *St. Michael Fighting the Dragon*, of *c.* 1500, Albrecht Dürer illustrates various composite bows. In his painting of *Hercules combating the Birds of Stymphalos* in the Germanisches Nationalmuseum, Nuremberg, executed at the same time, the archer is drawing a powerful composite bow, and he wears a Turkish bow case. Olaus Magnus in his *Historia de Gentibus* of 1555 shows archers (some on skis) hunting various animals with what appear to be composite bows (Fig. 54).

As the Arabs took a composite bow with them in their conquests along the northern shores of Africa into Spain, the composite bow spread into Italy[33] and Spain. The Italian painting

54. Male and female hunters on skis with composite bows. From Magnus's *Historia de Gentibus* (1555).

The Miracle of the Bull of *c.* 1260 in the Church of Sant'Angelo, Vico l'Abate, near Florence, shows a hunter with a composite bow. Some of the best European exponents of this type of archery were the Venetian archers. A painting by Vittore Carpaccio of 1493 in the Accademia, Venice gives fine details of their bows and equipment. In the Musée de Cluny, Paris (No. 11047), is a hunting bow whose limbs are composed solely of horn set into a metal grip with silver mounts. It appears to be of west European manufacture and of the seventeenth century—a late example of the many attempts to emulate the success of the Asiatic bow.

The Chinese Bow

The Asian composite bow reached its largest and most exaggerated form when it spread to the Far East, to Mongolia, Manchuria, and China. From the very earliest times until the beginning of this century the bow ranked as one of the principal weapons for hunting in this area. Chinese books based on manuscripts dating back to the eleventh century give a great deal of information on the history and construction of the bow, although much of it is contradictory and apocryphal. Most accounts agree, for instance, that the wooden bow was invented by the Emperor Huang Ti in *c.* 2698 B.C. or by his immediate successors.[34] Archaeological evidence proves that the bow was in use at least by the Bronze Age Shang dynasty (*c.* 1550–1025 B.C.) and that it was probably of composite construction. In the accounts of a Chinese garrison of A.D. 264–330 the 'horn bow' is mentioned as a familiar weapon. From wall decorations on Han tombs of the fifth to eighth centuries A.D. we have pictures of mounted archers hunting birds and animals. The characteristic Chinese bow of the Middle Ages and modern times with long stiff ears and protruberant string-rests appears on monuments of the eighth to tenth century A.D.[35]

This Chinese bow is one of the largest of the composite bows consisting of a bamboo body with the belly reinforced with pieces of horn, the back being covered with sinew and finished with lacquer and silk thread. The long ears of the bow were usually made from mulberry wood. The bamboo was cut in winter, as it tended to decay or be attacked by insects in spring and summer; the horn was softened and made ready for use in the spring; the sinews were prepared in the summer and all the

55. Chinese archer using typical large bow with long ears. After the woodcut by the Japanese artist Tachibana Morikuni, 1727.

materials were worked up and put together in the autumn. How this was done is described in Sung Ying Hsing's *Tien-Kung K'ai-wu* of 1637:

The first thing to be done when making a bow is to prepare a flat strip of bamboo. . . . The prepared bamboo strip, having a slightly narrow centre and two relatively wide ends is about two *ch'ih* long. One side is first coated with glue on which the horn is fastened, while the other side is covered with a layer of glue, and the whole thing reinforced by winding a sinew around it. The horn is made by joining the toothed ends of two pieces of oxhorn together. (This type of long oxhorn is not available to the northern barbarians, who have to use four pieces of sheephorn joined together to form a horn plate. In Kwangtung province, the horns of both water buffalo and yellow cattle are used by the bow maker.) The horn plate of a bow is strengthened by covering it with ox sinew and glue, and the coating of glue is in turn covered by birch bark,[36] which is soft and resilient, and gives the name 'warm grasp' to the bow.

The sinew taken from the spine of an ox is rectangular in shape and weighs about thirty ounces. After an ox is killed, the sinew is first dried in the sun then soaked and softened in water, and finally separated into flax-like fibres. The resulting sinew fibres are twisted into bow strings by the northern barbarians, because of their lack of silk fibres.

In China proper, however, the sinew fibres are used for protecting and reinforcing the body of bows. The fibre is also made into cords for bowing cotton.

Glue is made from the bladder and intestines of fish. The boiling is largely carried out at Ning-Kuo commandery [in modern Anhui province]. In Chekiang where the *Seiaena schlegeli* fish is obtained from the East Sea, the bladder that remains from the making of dried salt fish is converted into glue, which is stronger than any kind of metal or iron. The northern barbarians also manufacture a glue by boiling sea-fish bladders. This glue is as strong as the Chinese products, though it differs from the latter in some properties. It is not a mere coincidence that these raw materials are created by Heaven, since the lack of one of them will prevent the making of a good bow.

The newly-made crude bow is placed on the rafter or a shelf in a room and is dried slowly from underneath by a constant fire on the floor. The drying period varies from a minimum of ten days to a maximum of two months. The completely dried bow, being taken out of the room, is first polished, and then reinforced with ox sinew, glue, and Chinese wood lacquer to result in the best product . . .

Silk filaments from worms fed on the leaves of thorny trees are used for the making of bow strings, because they are stronger and tougher than [mulberry silk]. To make a string, a silk thread is tightly wound around a core of more than twenty silk threads in three sections. . . . Such a cord can be folded into thirds when the bow is not strung. In past, the northern barbarians used ox sinews for making all their bow strings, which could be easily spoiled by rain and fog. Therefore, they generally avoided war with China during the summer season. Nowadays, however, silk bow-strings are also widely used by the northern barbarians. Bow strings may be coated with yellow wax, although it is not absolutely necessary.

The nock at each end of a bow for receiving the string is covered with a piece of extremely thick ox leather or soft wood. This covering material, called cushion, serves the same purpose as the pegs of a lute. When the string is drawn and snapped back to its original position, a tremendous force is developed towards the inside surface of the bow. The bow is protected from such a destructive force [by the cushion] otherwise it will be damaged.[37]

Some books went into more detailed instructions. The *Chou Li*, which distinguishes five kinds of archery, mentions seven kinds of wood for the body of the bow, recommends the choosing of horn according to certain natural colours, and suggests the use of top-grade sinew (thick-set and glossy), and so on. It also gives

lists of bows made for various purposes. The *chia kung* and *sou kung* were for shooting at targets, birds, and beasts. Hunting bows were to be adorned with green bands. The favourite lacquer colour was red although this was sometimes a distinction of class being reserved for the Emperor. Apart from the different types and qualities of bows, the pull of the bow was adjusted during manufacture to suit the strength of the archer concerned (Fig. 56). Bows are still catalogued in terms of their pull in 'catties' of 60, 100, 120 (strong) and 160 (tiger's strength).[38]

56. Determining the weight or pull of a Chinese bow. Woodcut from the *Tien-Kung K'ai-wu* (1637).

It is difficult to identify actual specimens of Chinese bows with the descriptions in the old books. Perhaps the most distinguishing features of the Chinese bow are the large, sharply angled wooden ends or ears of the limbs with their protruding bone fulcrums. Some ears are covered with shagreen. Lengths of bows catalogued as Chinese vary from $3\frac{1}{2}$–$6\frac{1}{2}$ ft. Saxton Pope described a Chinese bow obtained from Shansi province:

> The belly is composed of whalebone or horn of the water buffalo inlaid on the edges with some yellow metal. The handle is of shagreen, a shark skin. The back is covered with a thin veneer of birch bark. The ears or ends of the limbs are of a wood resembling beech. The nocks are of inserted buffalo horn. The string is silk, terminating at each end in a long loop. The knot of the loop is a perfect bowline knot, and serves as a resting place for the string as it crosses the bone fulcrum or block which . . . serves to keep the string from slipping when the bow is braced, and likewise gives a clear vibration of the string when the bow is discharged.[39]

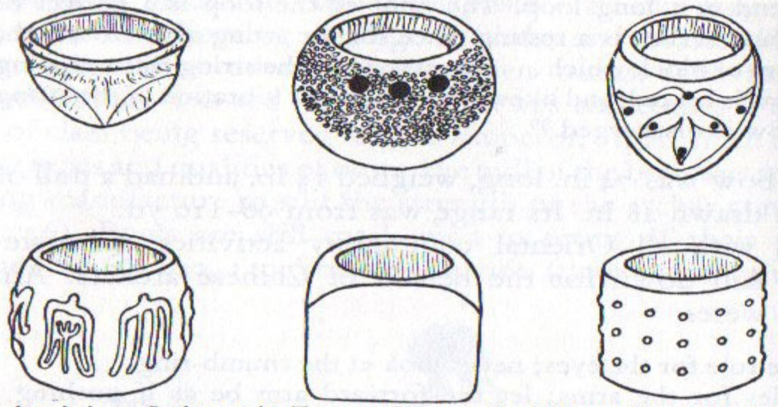
This bow was 74 in. long, weighed $1\frac{1}{2}$ lb. and had a pull of 30 lb when drawn 28 in. Its range was from 90–110 yd.

As with all Oriental community activities elaborate rules were laid down for the benefit of Chinese archers. Amongst these were:

> The rule for the eyes; never look at the thumb-ring.
> Rules for the arms; let the forward arm be as if pushing over a mountain, and the hinder one as if grasping a tiger's tail.
> Rules for the body; let the cheeks avoid hanging downwards; let the head avoid nodding; let the breast avoid swelling out forwards, and the back from being humped.[40]

The Chinese used the Mongolian type of release but their thumb-rings were of a different design to those used in Persia, Turkey, and India. Called *chüeh shih* or *p'an chi* (i.e. the fingers regulator), they were made from ivory, jade, chalcedony, and horn: metal does not appear to have been used. The majority of those preserved are cylindrical with one end chamfered concave and the other convex. Some are of D section similar to a group of old Assyrian rings, and very early examples are more like those of the Middle East. A thumb-ring of dark green jade in the British Museum, which dates back to the fourth and third century B.C. is akin to the Turkish type except that it is covered with archaic decoration and has a curious projection on the narrower section.[14] Many of these rings appear to be too small for use and there is no doubt that they were worn as ornaments or charms, especially the finely carved ones. Some even appear to have formed part of a set of ceremonial objects.[42]

The rings said to be most prized were of the Han dynasty carved from a greyish-white jade coloured with red veins and green streaks. Others which had the added advantage of affording a spiritual protection were those found in tombs and graves of former warriors and had a reddish-brown tinge.[43] In some of the early weapon manuscripts are also mentioned *shê* or *t'a*, which were rings of red reeds meant for the three middle fingers



57. Archers' rings. *Left to right. Top row*: Bronze, Turkish, medieval; bone set with brass studs and turquoise, Middle Eastern, medieval; jade set with corundum, Indian, eighteenth century. *Bottom row*: Cylindrical jade carved with an archaic inscription, Chinese, Ming; Jade, D-shaped, Chinese, Ching; cylindrical jade, Chinese, Ching. (Private collections).

of the left hand. Leather finger cots were also used. Chinese bow cases followed the usual Eastern pattern designed to cover the lower half of the bow and were decorated to match the bucket-shaped quiver.

Japanese Bows

In the early days of its history, the arts and sciences of Japan were influenced by the cultures of its great neighbour China. The T'ang dynasty (A.D. 618–906) which brought peace and prosperity to China encouraged a two-way traffic of scholars and craftsmen between the two countries. This interchange of culture is apparent in the design of weapons. The first Japanese swords, for instance, have features similar to those of north China and Korea. A poem of the Japanese Empress Suiko (593–629) recommended 'the colts of Hyūga Province; as for swords the good blades of Kure [China] are best!' Japanese legends are full of the exploits of the Chinese archers. One of the most skilled was Yoyuki who brought down a goose flying above a cloud, his aim being directed solely by the cries of the bird.

Many of the Japanese bows of this period were based on the mainland composite type. In the Imperial Repository Shōsōin at Tokyo are a pair of large silver jars dated 8 March 767 and engraved with mounted archers hunting boar and deer. The

archers are using composite bows with long ears identical with the Asiatic type. In the same repository, however, and of the same period, are preserved some specimens of long straight bows made from *Azusa* (*catalpa*) and *tsuki* (*zelkowa*) woods. They are self bows with traces of binding. In the year A.D. 764 the Repository issued over a hundred bows made of various woods including the above and also of *aye*, *mayumi* (spindlewood), and *nemi* woods.[44] As the power and prestige of the T'ang dynasty declined, the Japanese began to implant a character of their own on all their products and they eventually concentrated on the development of these long slender bows made of wood and bamboo. But the Mongol invasion of 1274–81 brought reminders of the power of the shorter composite bow of the mainland and the Japanese continued to make some bows of this kind as well. Archery became an essential part of the education of the nobleman and the art of shooting from horseback at speed was diligently cultivated. Even after the introduction of hand firearms in the sixteenth century the bow was still regarded as the most important sporting arm and continued to be treated as such until the second half of the nineteenth century.

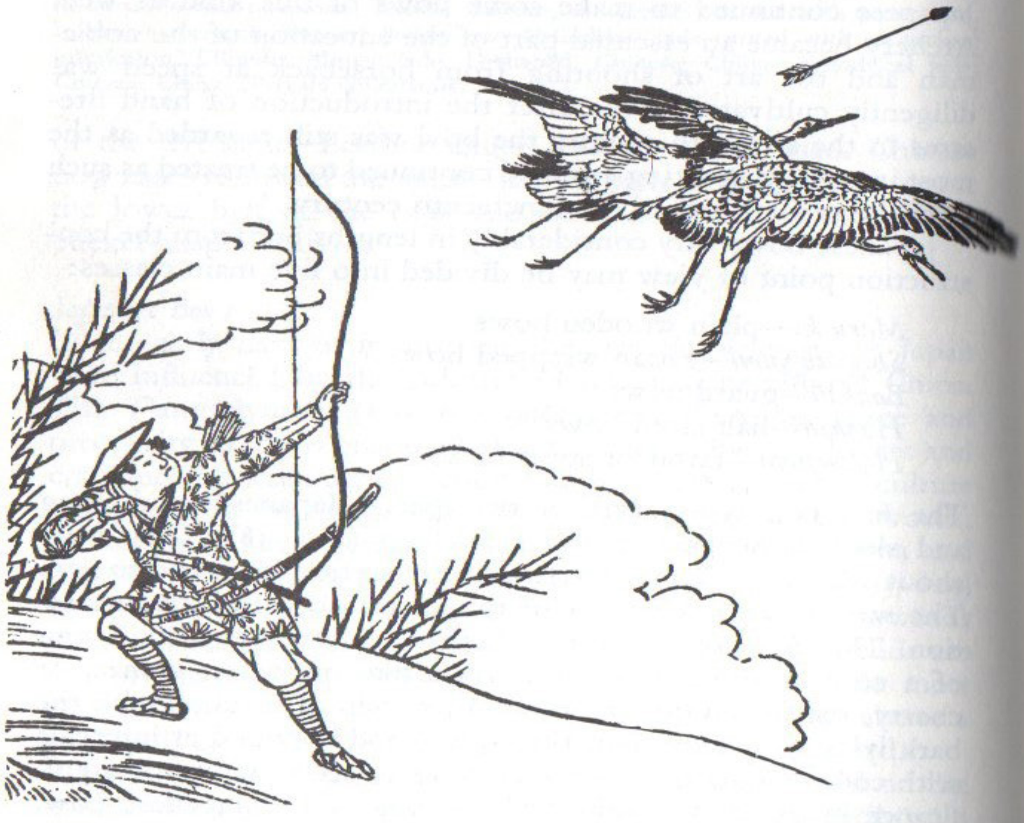
Japanese bows vary considerably in lengths but from the construction point of view may be divided into five main classes:

Maru-ki—plain wooden bows
Shige-tô-yumi—rattan wrapped bows
Bankiū—guard bows
Hankiū—half-sized bows
Hoko-yumi—tartar or spear bows

The first two types were of the special Japanese kind, long and slender, between 7 and 9 ft. long (Fig. 58). They were about 1 in. wide and of nearly uniform section from end to end. The *maru-ki* were self bows of round section with little decoration. The *shige-tô-yumi* were of built-up construction consisting of a core of some deciduous wood like mulberry, sumac, or cherry, reinforced on either side by a strip of bamboo with the bark lying outwards. This three-ply wood is bound at intervals with coils of rattan, all of which have a special name and significance in the semi-religious philosophy of the Japanese bow. The two arms of the bow are slightly curved and reverse when strung. A recognizable feature of the Japanese bow is the position

of the grip (*nigiri*), which is placed about one third of the way down in order to accommodate the short stature of the Japanese archer when shooting from horseback or from the kneeling position. One of the rattan coils, the *metsukebushi*, is of a practical nature, being used for sighting.[45]

The *bankiū* and *hankiū* were of much smaller size, the latter meaning, in effect, a half-sized bow. These were popular for shooting from horseback. In the *bankiū* group were ceremonial guard bows, mainly of an ornamental rather than practical use. The *hoko-yumi* was a composite bow based on the old Chinese type and was frequently reinforced at its extremities with metal. A detachable spear head, *yumi-yari*, some 3–4 in. long, with its own



58. Japanese archer. After the woodcut by Morikuni, 1729. Note the long bow which has turned in the hand so that the string rests on the back of the wrist.

string notch, could be slipped over the horn if considered necessary converting the simple bow into a combination spear-bow.[46]

With the long-bows drawn well behind the ear, as was the Japanese custom, the Japanese arrows were consequentially of much greater length than those of the European pattern and many of the arrowheads made for use with the great *shige-tô-yumi* were large enough to be mistaken for lance heads. There is probably some truth in the stories of the giant archer Tametomo (1139–70) who used a bow 8 ft. 9 in. in length and is reported to have sunk a small boat with a single heavy arrow. Japanese arrowheads, *yano-ne*, made of metal, have been fashioned in a bewildering variety of shapes and sizes (Fig. 59), but they can be grouped into four main classes:

Togari-ya—In this class of arrowhead are included a wide range of shapes from long pointed lance-heads to the broad, flat heart shapes. Many of the latter were cut out with designs.

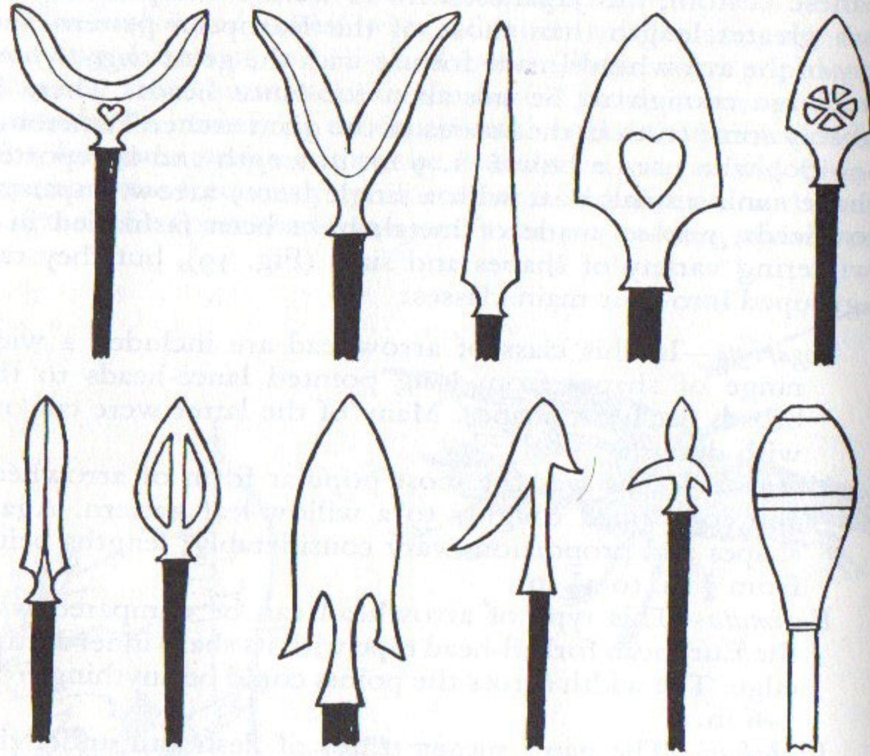
Yanagi-ha—This was the most popular form of arrowhead and conformed roughly to a willow-leaf pattern. Again shapes and proportions vary considerably; lengths being from $\frac{3}{4}$ in. to $2\frac{1}{2}$ in.

Karimata—This type of arrowhead can be compared with the European forked-head type with its sharp inner cutting edge. The width across the points could be anything from 1–6 in.

Watakusi—The name means tearer of flesh and under this heading were brought a number of vicious and ugly arrowheads with barbed points.

Within the four main classes were many variants each with its own specific name. Thus amongst the *togari* was an arrowhead called *rinzetsu* (dragon's tongue). One of the flesh tearers was known, somewhat disarmingly, as the *omodake* (water plantain). There were also large arrowheads magnificently chiselled with decoration or carved with poems intended as treasures for the temples.[47] Wooden arrows such as the *kabura-ya*, a turnip-headed arrow with a perforated whistling head, do not concern us, as they were not normally used for hunting. The *ki-hoko*, a padded wooden head, however, was used in the Dog Hunt

(*inu-oi*), a distasteful sport instituted in the twelfth century by the Emperor Toba. In this a dog was released in the middle of a fenced area to be the target of mounted archers riding the perimeter.



59. Japanese arrows. *Left to right. Top row*: Two forked heads (*karimata*); lance and heart-shaped heads (*togari-ya*). *Bottom row*: Two willow leafs (*yanagi-ha*); three flesh tearers (*wata-kusi*); blunt head (*ki-hoko*).

To house all these different kinds of arrows a wide range of quivers were available, many of great beauty made for officers, guards, and parades. But the hunting quiver *kari-yebira* was often little more than a framework of bamboo in which the arrows were secured by throngs. A very simple quiver was constructed from a length of bamboo capped with wood. Another quiver seen on hunters in pictures was the *utsobu*, of cylindrical shape with a covering of fur or leather and an aperture in front at its lower part. One of the short varieties of Japanese bows made of whale-

bone, and only 2–3 ft. long, was often carried in an open lacquered case, *rimankyu*, together with its arrows.

The Japanese method of shooting was unlike that of the Chinese. The bow was held lightly, 'as one holds an egg in his hand', and was allowed to pivot in the hand after discharge so that the string struck the left hand on the back and with less force than that of the frontal blow of the normal discharge. The delicate control of the bow which the Japanese archer sought as an ideal is emphasized in the instructions that 'the bow should never know when the arrow is to go . . . the archer should be unaware of the arrow's departure . . . such a shot is said to leave a lingering resonance behind . . . the arrow moving as quietly as breath, and indeed almost seeming to be a living thing'.[48] The Mongolian release to the string was employed but the thumb-ring was replaced by some form of shooting glove (*yugake*) with a padded and grooved thumb. For more formal shooting, shooting sleeves (*yugote*) and wrist-guards (*tomo*) were worn. In spite of its great size the Japanese long-bow did not compare in strength with the shorter composite bow and its maximum range rarely exceeded 200 yd.

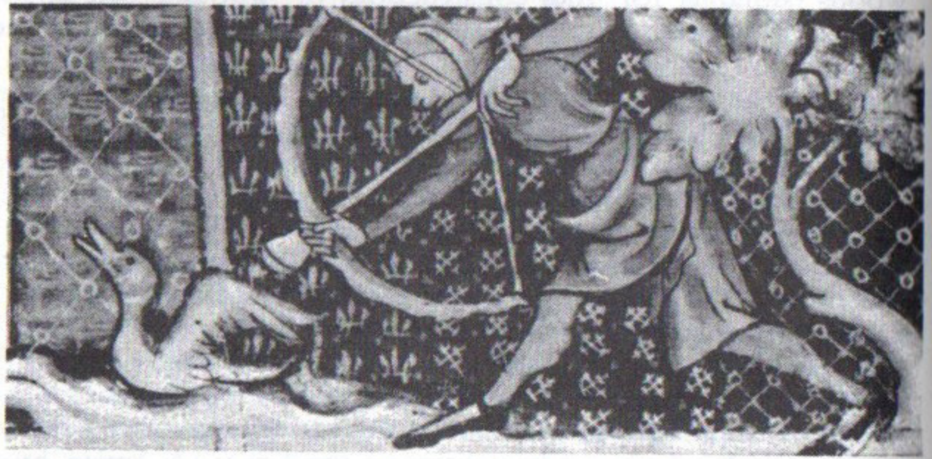
The Bow in Britain

One reason, perhaps the main one, for the development of the composite bow by the nomadic tribes of Asia, was the scarcity of woods suitable for the construction of wooden self-bows, compared with the abundance of horn and sinew available for the manufacture of composite staves. In Europe natural conditions favoured the wooden bow. The majority of bows surviving from the Neolithic period are self-bows made from elm or yew with the latter wood predominating. The bows vary in length from 4–7 ft., the shorter ones being rarer. This pattern of bow manufacture was to remain relatively unchanged in western Europe for hundreds of years, the simple wood bow remaining the common man's weapon up to the end of the Middle Ages, and reaching its peak of development in Britain.

A yew bow found in a peat bog near Cambridge, England, dating to *c.* 1730 B.C., is approximately 5 ft. long. Although the back has been flattened the rest of the surface has been left and no attempt has been made to remove the knots. A Saxon bow buried with its owner at Chassel in the Isle of Wight is of similar

length and crude construction.[49] Giraldus Cambrensis described the bows of the Welsh archers in 1188 as 'not made of horn, ivory or yew, but of wild elm; unpolished rude, and uncouth, but stout; not calculated to shoot an arrow to a great distance, but to inflict very severe wounds in close fight'.[50] A contemporary drawing of a Welsh archer has been inserted in a late thirteenth-century copy of the 1267 treaty between Henry III of England and Prince Llywelyn. He holds a rather short bow—although one has to allow for artist's licence—its back covered with bumps or knots.[51] In 1297 we have what is probably the first description of an English long-bow. Used in the murder of Simon of Skeffington it was said to be made of yew, 6 in. round at its widest girth and one ell and a half long (approximately 5 ft.).[52] The *Holkham Bible Picture Book*[53] of *c.* 1330 and Walter de Milemete's *De Nobilitatibus Sapientiis et Prudentiis Regum*[54] of 1326–7 illustrate several such bows in use, all of unfinished appearance with their knots clearly indicated (Fig. 60).[55] The royal hunter on horseback in the thirteenth-century manuscript *Apocalypse* in the Bodleian Library, Oxford (Douce MS. 180), holds a similar rough-hewn bow, about 4 ft. long, just as knobbly as those depicted in the previous manuscripts quoted.

The long-bow, however, was not the only type of bow in use. During Saxon and Norman times a much shorter bow seems



60. Shooting birds with the blunt arrow. Note the rough finish to the bow. Detail from Walter de Milemete's *De Nobilitatibus, Sapientiis et Prudentiis Regum* (1326–7).

to have been favoured, especially by hunters. Representations of the bow occur frequently in Saxon manuscripts and, if the artists were correct in their delineations then the most popular bow was nearer 4 ft. in length. Certainly the mounted hunter would have found it difficult to manipulate a long-bow whilst conducting a chase over the countryside. These shorter bows, for the most part, appear to be of wood but the Saracen composite bow was also known and found its way into the armouries of the wealthy. The painting of Christ in the twelfth-century *Canterbury Psalter*[56] shows Him holding what appears to be a composite bow. These powerful bows occur frequently in fourteenth-century inventories. That of John Marmaduke, Governor of Perth, Scotland, in 1311, lists one of whalebone (*i arcus de Balayn*).[57]

Nevertheless the earliest treatises on hunting, those of Le Roy Modus and Gaston Phoebus, give the measurements of the bow as between 20 and 22 handsful or fists in length. This would be between 5 and 6 ft., the dimension of a long-bow. Modus in his advice to the huntsman goes on to direct that when the bow was braced that there should be the space of a full palm and two fingers' breadth between its belly and the silk string. This distance was known as the 'fistmele'. The arrow should be 10 handsful in length ($2\frac{1}{2}$–3 ft.), with barbs which ran parallel to the nock. It was to be held between the forefinger and middle finger with the third finger helping to pull the string (Fig. 61). This form of draw or release was classified by Morse as the

61. Hunter using the broad arrow or swallow tail against boar. Woodcut from *Le Livre du Roy Modus* (1486).

Mediterranean release.[58] Most of the shooting instructions which followed related to hunts where game was driven by dogs and mounted foresters on to positions where archers on foot stood hidden. The archers were advised to use weak bows which could be held half-drawn for a long time. The mounted archer was also advised to carry a weak bow mainly because of the difficulty of manipulating bow and horse at the same time. Only the foot archer seeking 'to shoot at view' was told to carry a strong bow 'because he will have to take aim from a greater distance; because his mark being a flight shot, he may extend his arms more fully, and lay his body in the bow; because he will have no occasion to hold the arrow drawn up, even for an instant, as he is directed to do when at stand'.

Gaston Phoebus's instructions are similar but his description of the arrow is more detailed and is interesting because it gives the size of the hunting arrow known as the 'broad-head': 'the wood of a well-formed arrow measures eight handsful in length from the end of the nock to the barbs of the head, which will be exactly four fingers broad, from the point of one barb to the point of the other. It must be duly proportioned in every part, well filed and sharpened, and five fingers in length.' At the conclusion of this chapter Gaston Phoebus advised his readers: 'I do not know too much about bows. He who wants to know all about them must go to England, for there it is their real craft (*leur droit métier*).'[59]

These words written in the fifteenth century, reflect the respect that every continental soldier and sportsman had for the Englishman's skill with the long-bow. From the beginning of the fourteenth century the long-bow in the hands of the English and Welsh soldiers had become the most decisive of military weapons. Although in design and construction it differed little from the Neolithic bow, the rigorous training that every Englishman was expected to undergo from childhood, had effected an extraordinary transformation in its performance. The rise of the long-bow can be said to have begun at the end of the twelfth century, perhaps because of the exploits of the Welsh archers. Giraldus Cambrensis recorded that at the siege of Abergavenny Castle in 1181, Welsh arrows pierced a gate 'four fingers thick'; another passed through a knight's armoured thigh and saddle killing his horse beneath him. At first the English army attempted

to counter such powerful marksmanship with the crossbow, and the latter had a sudden upsurge of popularity in the thirteenth century. But by the first quarter of the fourteenth century the English had wholeheartedly adopted the long-bow.

Town sheriffs began to receive instructions to lay in supplies of 'good and sufficient bows'; white bows at 12*d*. each and painted bows at 18*d*. each. The arrows were to be 'an ell long; of good and dry timber well-steeled heads with broad barbs (*falas largas*)'. They were sold in sheaves or trusses of twenty four, at 14*d*. per sheaf steeled (*aceratae*) and 12*d*. non-steeled.[60] Following the success of the English archers at Crécy (1346) and Poitiers (1356) every effort was made to maintain the standard of archery amongst the populace. In 1363 and 1365 Edward III ordered the sheriffs throughout England to enforce all able-bodied men between the ages of 15 and 60 to practice with the bow and arrow on feast days and on other leisure occasions.

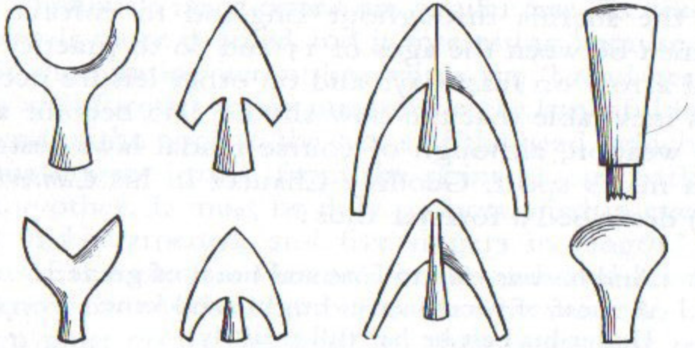
It was inevitable that the bow should also become a popular hunting weapon, although of course feudal laws restricted the common man's sport. Geoffrey Chaucer in his *Canterbury Tales* (*c*. 1364) described a forester thus:

And he was clad in cote and hood of grene;
A sheaf of pecok-arwes brighte and kene
Under his belt he bar full thriftily;
(Wel coude he dresse his takel yemanly;
His arwes drouped noght with fetheres lowe),
And in his hand he bar a mighty bowe,
A not-heed hadde he, with a broad visage,
Of wode-craft wel coude he al the usage.
Upon his arm he bar a gay bracer.

It is interesting to note that Modus also advised the forester or hunter to wear 'a coat of green; and, in summer and autumn, one of russet colour resembling that of the woods'.

There was some difference of opinion as to the type of feather (*pennes*) to be used. Peacock feathers are often mentioned in contemporary records but many archers preferred the feathers of the goose. Amongst the possessions of Thomas, Archbishop of Canterbury, in 1397, were '31 sheaves of arrows feathered with white moth-eaten goose feathers'.[61] William de Kyrkby in 1391 bequeathed arrows feathered with '*pennis altiliis*' (domestic

birds feathers). Adam Tyldesley, in 1457, left arrows '*pennatas cum albis plumis*' (with white feathers). In 1475 Thomas Eme described his best sheaf of arrows as '*plumatarum cum gruibus nigris*' (with black crane feathers). The Inventory of Sir John Fastolfe's effects in 1459 included arrows feathered with swan; no doubt other kinds of plumage were put to the same use.[62] Roger Ascham, in his *Toxophilus* (1545), went into the subject of arrows in great detail, listing fifteen different kinds of woods which could be used for the shaft.[63] On the subject of feathers he concluded 'ye Pecockfether doth seldome kepe up ye shaft eyther ryght or level, it is so roughe and hevy, so that many men which have taken them up for gayenesse, hathe layde them downe



62. Types of arrows. *Left to right*: Forked heads, broad arrows, swallow tails, blunt heads or *bougons*.

agayne for profyte, thus for our purpose, the goose is best fether for the best shooter'.

Arrowheads used for hunting were of three main kinds. The first, known as the broad-arrow head or swallow-tail, had two large barbs sloping back towards the shaft (Fig. 62). Some of exaggerated form can be seen in the *Holkham Bible Picture Book* of *c.* 1330.[64] Fifteenth-century manuscript editions of Gaston Phoebus show the broad head being handled by crossbowman and archer alike. In the second type of arrowhead the two barbs point forward and are joined by a concave cutting edge. These were the fork-heads or forkers. Their vicious cutting blades, often employed against large game, were also put to another purpose. Liebault in *La Maison Rustique* (1620) advised: 'For

geese or other large birds they [the arrows] should be double-forked, sharp, and strong, to cut a wing or a neck clean off. The blow from a common shaft rarely inflicts a wound sufficient to bring down the game at once; notwithstanding she be hurt or shot through, she will fly off and die in another place.'

Against birds and smaller game like hare the third type of arrowhead was normally used. This had a blunt or rounded head made of wood which had the advantage of not marking the fur or pelt. In the great twelfth-century church of Monreale at Palermo, Sicily, the mosaics of biblical subjects include one of Esau shooting birds in trees with these blunt arrows.[65] They can be seen in most of the hunting works already quoted and in a fifteenth-century French manuscript version of Crescentius's *De Re Rustica* in the British Museum. In the last work they are called '*matras ou bougons gros en la teste devant*'. The writer goes on to explain the best way of shooting birds in a tree:

> He that purposes to disport himself with killing doves and other birds perched upon trees, must have bolts all of equal weight; and when about to let fly an arrow, he should note the exact place where he stands at the time, and also the place of the bird; and if he succeed in bringing her down, then hath he his desire, and shall get his arrow again. But, if he miss, and have duly marked his standing, and the place where his game was when he shot, let him return back and loose another arrow towards that spot, and there is no doubt but he shall recover both.[66]

This kind of shooting was considered suitable for ladies. The author of a *Ménagier de Paris* gave this advice to the huntress:

> At the end of the month of September, and after, when the hawking of quails and partridges is over, and even in winter, you may hawk at magpies, at jackdaws, at teal . . . at blackbirds, thrushes, jays, and woodcocks; and for this purpose you may carry a bow and a bolt, in order that, when the blackbird takes shelter in a bush and does not quit it for the hawk which hovers over and watches it, the lady or damsel who knows how to shoot may kill it with the bolt.[67]

Regnard who travelled in Lapland at the end of the seventeenth century noted the use of these wooden blunt heads and two other forms of hunting arrows:

> Some [arrows] are composed solely of wood, and are employed to kill, or rather to stun, the minevers, the ermines and the martins, and

other animals, whose skins they are desirous of preserving; there are others covered with the bone of the rein-deer, made in the shape of a harpoon, and long pointed; this arrow is thick and heavy; the latter is employed against birds, and never comes out of the wound when it has once entered the body; it also by its weight prevents the bird from flying, and carrying away with it the arrow and the hopes of the huntsman. A third kind is covered with iron, in the form of a lancet, and is employed against the large animals, such as the bears and the wild rein-deer.[68]

Mention must be made of the archer's wrist-guard, Chaucer's 'gay bracer'. In the normal way it was little more than a wide leather strap or piece of wood or ivory tied to the archer's left wrist in such a way that the surface was left smooth. Roger Ascham was his usual forthright self on this accessory: 'A bracer serveth for two causes, one to save his arme from the strype of the strynge, and his doublet from wearynge, and the other is, that the strynge glydynge sharpelye and quicklye of the bracer, may make the sharper shoote.'[69] A bracer in the British Museum, said to have belonged to Henry VI, is of embossed leather moulded to fit over half the arm.[70] Bracers of the sixteenth and seventeenth centuries were often of ivory engraved with a suitable scene or motto (Fig. 63).

On the subject of the bow Ascham was quite definite. Although he mentions bows of Brazil wood, elm, wych-hazel, and ash, he is convinced of the superiority of the yew. He tells his pupil how to choose a bow: 'if you come into a shoppe and fynde a bowe that is small long, heavy and strong, lyeinge st[r]eyght, not windyng, not marred with knot, gaule, wyndeshake, wem, freate or pynche, bye that bowe of my warrant.'[71] Chaucer would no

63. Archer's bracer of engraved ivory. French, sixteenth century. After Longman's, *Archery*.

doubt have agreed with every word. The yew bow was not as powerful as the best composite bows but it was strong enough for most purposes. An anonymous French fifteenth-century treatise *La fachon de tirer de larc a main*[72] confirms that the normal range of the yew bow was 300 paces and that the more skilful archers could shoot up to 400 paces. At a close range the arrow had tremendous penetrative power. Modus warned his readers never to shoot an arrow directly into the side of a deer in case it went through and hit another huntsman. An archer could loose off five or six arrows, if necessary, whilst the crossbowman was reloading. The bow was relatively cheap and easy to make and, providing the necessary skill was available, it seemed the ideal weapon for sport and war.

During the fifteenth and sixteenth centuries the various guilds of craftsmen responsible for the manufacture of bows and arrows set up proper regulations for the control of the trade. In London the Worshipful Companies of Bowyers and Fletchers were responsible for ensuring the quality of the weapons, and there is every indication that they performed their duties well. But it was one thing to provide good bows, there had to be men capable of handling them. By the beginning of the sixteenth century it was becoming noticeable that the standards and numbers of archers were declining. Part of the trouble was the cost of the bowstaves of which the best ones made of Spanish yew had to be imported. An Act of Parliament passed in 1472, lamented that archery was 'greatly discontinued and almost lost' because of the scarcity of bow staves, and ordered a percentage of staves to be brought in with every cargo.[73] Ten years later the maximum price of a yew bow was fixed at 3*s.* 4*d.*[74] But there was another reason for the bow's decline. Although it had, at least in Britain, resisted the challenge of the crossbow, it now faced another more serious rival. By *c.* 1505 the wheel-lock and the match-lock were invented[75] and this soon led to the design of a light handgun, the arquebus, a new firearm which was gradually to seduce sportsmen from their love of the bow and which, in its military form the musket and caliver, was to finally deplete the ranks of the archers.

Nevertheless the changeover from bow to firearm was a slow process to start with. The English long-bow was still a respected weapon on the continent. Some illustrations in *Der*

Weisskunig show the Emperor Maximilian and his men practising with the long-bow (*das Englisch und bickardisch bogenschiessen*). When Henry VIII came to the throne in 1509 he set an example to his people by out-shooting every member of his bodyguard of archers. In 1512 he appointed Henry Southworth and Henry Pikeman Surveyors of the Bowmakers and Keepers of the Bows in the Tower of London.[76] Although he himself became fascinated with firearms and amassed a private armoury of them, he made sure that his peasants' and yeomens' powers with the long-bow should still prevail. Handguns and crossbows were only allowed to those citizens with lands above a certain value. In 1541 Parliament passed an Act (33 Hen. VIII, c. ix) which confirmed an Act of 1512 and enforced a number of measures to encourage the bow: 'Every man being the King's subject, not lame, decrepit nor maimed, nor having any other lawful or reasonable cause or impediment, being within the age of sixty years' was to exercise regularly with the long-bow; and every father was to provide his male children between the age of 7 and 17 years with bows and arrows. At the age of 17 every young man had to acquire a bow of his own.

Not much compulsion was needed, however. The bow was still a popular weapon with all classes. Thus Sir Thomas Wyatt (1503–42), a kind and faithful public servant in a hard-hearted and faithless court, found happiness in the privacy of his country estate where he wrote:

> This maketh me at home to hunt and hawk
> And in foul weather at my book to sit,
> In frost and snow then with my bow to stalk
> No man doth mark where I so ride or go;
> In lusty lees my liberty I take . . .'

In 1545 Roger Ascham published his classic book on archery *Toxophilus* which has already been quoted. He was a shrewd observer. Whilst appreciating that 'all Englishe men generally be apte for shotyng' he realized that few of them could be bothered to learn the correct way. His description of English archers drawing the bow conjures up visions of a motley army:

> Some shooteth, his head forwarde as though he would byte the marke: an other stareth wyth hys eyes, as though they shulde flye out: An other winketh with one eye, and loketh with the other: Some make a face writhing theyr mouthe and countenance so, as though they were doyng you wotte what: An other blereth out his tonge: An other bytheth his lyppes: An other holdeth his necke a wrye. In drawyng, some set suche a compasse, as thoughe they woulde tourne about, and blysse all the feelde: Other heave theyr hand nowe up nowe downe, that a man can not decerne whereat they wolde shote, an other waggeth the upper ende of his bow one way, the neyther ende an other waye. An other wil stand poyntinge his shafte at the marke a good whyle and by and by he wyll gyve hym a whip, and awaye or a man wite. An other maketh suche a wrestling with his gere, as thoughe he were able to shoote no more as longe as he lyved. An other draweth softly to ye middes, and by and by it is gon, you can not knowe howe.
>
> An other draweth his shafte lowe at the breste, as thoughe he woulde shoote at a rouynge marke, and by and by he lifteth his arme up pricke heyghte. An other maketh a wrynchinge with hys backe, as though a manne pynched hym behynde.
>
> An other coureth downe, and layeth out his buttockes . . .[77]

Nevertheless the English archer delighted in confounding his critics and, as Ascham himself admitted, 'every Englysshe archer beareth under hys gyrdle xxiiii Scottes'.

Foreign observers always had a healthy respect for him. 'Les Anglois', wrote De Comines, 'sont le fleur des Archiers du monde'.[78] Giovanni Michiel, the Venetian Ambassador, reported to the Venetian Senate in 1557 on the weapons of the English:

> But, above all, their proper and natural weapons are the bow and arrow, of which so great is the number, owing to the general use made of them by all sorts of persons without distinction of grade, age, or profession, that it exceeds all belief . . . such is their opinion of archery and their esteem for it, that they doubtless prefer it to all sorts of arms, and to harquebuses, in which they trust less, feeling more sure of their bows and arrows; contrary, however, to the judgment of the captains and soldiers of other nations. They draw the bow with such force and dexterity at the same time, that some are said to pierce corselets and body armour, and there are few among them, even those that are moderately practised, who will not undertake at a convenient distance, either aiming point blank or in the air (as they generally do that the arrow may fly farther), to hit within an inch and a half (*un mezzo palmo*) of the mark.[79]

In the same year Sir Thomas Elyote in *The Governour* praised the 'utylitie found in shotynge in the longe bowe, which is

Kyllnge of deere, wylde fowle, and other game; wherein is bothe profyte and pleasure above any artyllery'. The noble lords and their ladies still practised the art assiduously. The contents of the armoury at Burghley House, Stamford, in 1557 included:

> Longbowes—ij for my owne shotyng ye other for my wife
> ij lyvery booes wth a sheff of arrowes
> a quyver wth arrowes[80]

The great power of the bow was further demonstrated in the incident described in the letter written by Shan O'Neil from Ireland in 1565 to the Cardinal of Lorraine and Guise: 'When I was in England I saw your noble brother the Marquis d'Elbœulf transfix two stags with a single arrow.'[81]

This final flowering of the long-bow was to be followed by a swift and surprising decline. In 1572 the Fletcher's Company decided to bind fewer apprentices, as archery was 'not used and exercised as in times past'.[82] The Bowyers complained of the high price of staves which had risen from 40 shillings to £14 a hundred within forty years.[83] Efforts were made to improve the bow's efficiency in the face of the firearm's competition. In Paris, in 1575, the 21st article of the Rules of Master Gunmakers and Bowyers enjoined members to make bows formed of several pieces which were to be carefully fitted together and glued with a good glue—a form of composite bow.[84] But it was of little avail. In 1583 the Commissioners of Musters for the County of Huntingdon were obliged to apply to the Council for permission to furnish corselets in lieu of bowmen 'for want of strength in the men and in ability of using them'.[85]

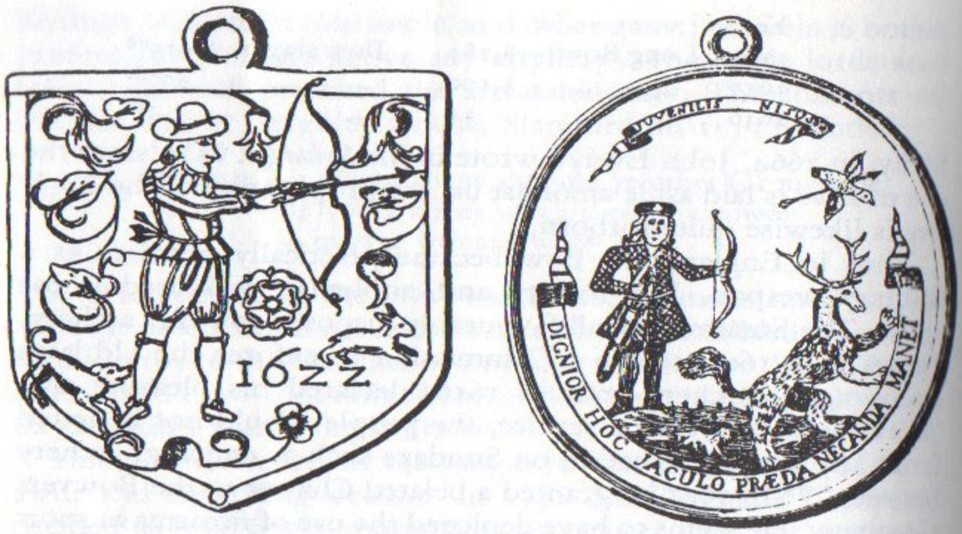
Holinshed in his *Chronicles*, published in 1577 just before his death, lamented the state of affairs which enabled French and Germans, in derision, to 'turn up their tails and cry, *shoote Englishmen*; and all because our strong shooting is decayed and laid in bed'; and he went on in good resounding fashion, 'but if some of our Englishmen now lived, that served King Edward III the breech of such a varlet should have been nailed to his bum with an Arrow, and another feathered in his bowels'. From time to time the Privy Council tried to help the dying trade by attempting to enforce the 1541 Act but the course of events is perhaps best illustrated by the numbers of bows in the stores of the Tower of London:

Year				
1599	Long Bows	8,185	Bow staves	6,019[86]
1617	,, ,,	3,500	,, ,,	400[87]
1636	,, ,,	33	,, ,,	288

Sadly, in 1664, John Evelyn wrote in his *Sylva* (p. 65): 'since the use of *Bows* is laid aside amongst us, the propagation of the *Eugh-tree* is likewise quite forborn.'

Thus in England the bow became practically obsolete as a military weapon. But royalty and noblemen still used it for sport. The Stuarts were all favourably disposed towards archery. James I, in 1606, set up a Commission to enforce the old laws encouraging archery and, in 1616, declared his pleasure that 'after the end of divine service, the people should not be letted from any lawful recreation on Sundays such as dancing, archery for men'.[89] In 1621 he granted a belated Charter to the Bowyers Company. He seems to have deplored the use of firearms in sport and his main delight was hunting with a specially-trained pack of hounds who would single out a deer and hunt it to exhaustion. Duke Johann Ernst of Saxe-Weimar, a guest of James I at Theobalds in 1613, wrote: '. . . the King hurries incessantly after the dogs until they have caught the game. There is therefore no particular enjoyment in the sport . . . His Majesty, however, now and then uses long bows and arrows, and when he is disposed he shoots a deer.' James's Queen, Anne of Denmark, also took part in the hunt. In the same year it was reported: 'The Queen, shooting at a deer, mistook her mark, and killed Jewel, the King's most principal and special hound; At which he stormed exceedingly awhile, but after he knew who did it, he was soon pacified and with much kindness wished her not to be troubled with it, for he should love her never the worse; and the next day sent her a diamond, worth £2,000, as a legacy from his dead dog.'[90]

Charles I appointed more commissions under the Great Seal in order to make the use of the long-bow compulsory and he gave a new charter to the Artillery Company, a society whose original constitution of 1537 had included the promotion of archery.[91] Both monarchs maintained a royal bowmaker and a Keeper and Yeoman of the Bows, but the use of the bow was regarded more in the light of a formal sport and recreation than a serious means of hunting. Thus Charles I in 1627, issued



64. Scottish archers' medals. *Left*: Robert, Lord Dalkeith, 1622. *Right*: Alexander Haldane, 1721. In the Collection of the University of St. Andrews, Scotland.

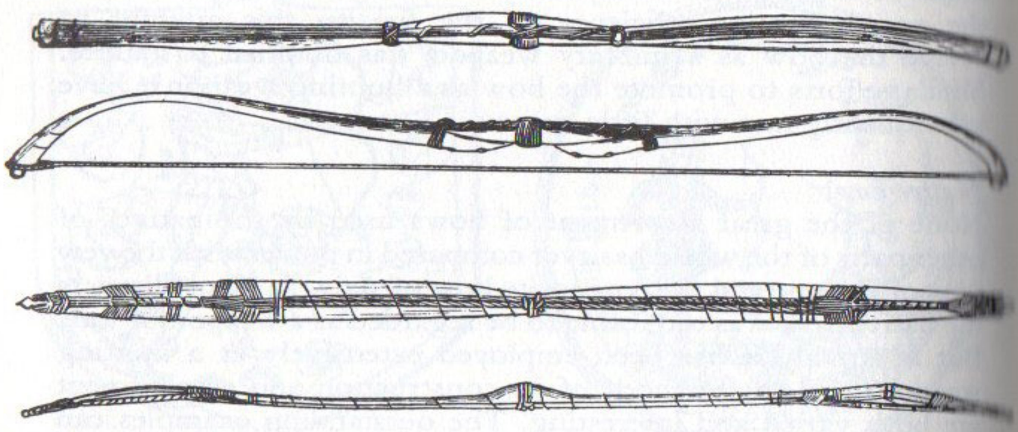
warrants to 'William Magoone and James Mawborne our two Ayme Givers to each of them Tenn pounds of the year for their Apparrell in Consideration of their attendances and service to give us Ayme in our exercise of shootinge wth the Longe Bowe'.[92] After the Restoration Charles II reintroduced the various Royal Household appointments and Jervas Price became 'Gentleman of ye Bowes in Ordinary'. Pierre Guenon de Beaubuisson was one of the last holders of the post, combining the appointment with that of Keeper of the Private Armoury in Ordinary. In 1691 he accompanied William III to Ireland.[93]

The art of archery was kept alive during the late seventeenth and early eighteenth centuries by archery societies such as the Finsbury Archers and the Royal Foresters in England, and the Royal Company of Archers in Scotland. In the last quarter of the eighteenth century there was a great revival of interest in archery. The Royal Toxophilite Society, the Royal Kentish Bowmen, the Woodmen of Arden, the Hainault Foresters, the Loyal Archers are but a few of the societies which flourished in England. But their activities were in the main directed towards the sport of target shooting. In 1798 Richard Mason published his *Considerations of the reasons that exist for reviving the use of the long-bow with the pike in aid of the measures brought forward by His Majesty's Ministers for the defence of the country*. But in the face of the ever-increasing efficiency of the firearm this attempt to revive the bow as a military weapon was doomed to failure. Similar efforts to promote the bow as a hunting weapon[94] have subsequently met with little success.

Native Bows

None of the great assortment of bows used by the natives of other parts of the world has ever compared in power with the yew bow of Europe and the composite bow of Asia. In many districts the native bow was too feeble to be regarded as a weapon of war. But invariably it has been employed extensively as a hunting weapon; and the methods of its construction and employment are both varied and interesting. The outstanding examples can be mentioned briefly here. The wooden self-bow was very widely distributed throughout the world but either the unsuitability of local woods or the lack of local knowledge and ability prevented it from being developed to the extent reached in western Europe. The composite bow which spread so rapidly from its source in the northern regions of central Asia seems to have been confined in the end to that continent.

The primitive type of composite bow with the sinew backing in the form of plaited cords wound on to the wooden stave does seem to have spread from Asia via the Behring Straits to North America. But it may equally well have been an independent development in a land where suitable wood for a self-bow was non-existent. The Eskimo, who in many parts had to rely on driftwood for his supply of basic material, was often forced to construct his bow entirely from reindeer horn with a sinew reinforcement (Fig. 65). In the main, however, with great ingenuity he succeeded in producing a bow stave of wood held together and strengthened with a complicated lashing of sinew thongs (Fig. 65). In the western regions in the neighbourhood of the Behring Straits this binding is most extensive and it is noticeable that the outline of the bow is of the Tartar or Chinese pattern. Where the Eskimo had recourse to a supply of wood, as in Alaska, he made a powerful bow using a thick stave of Douglas fir, backed with a strap of whalebone and strongly laced with sinew strands.[95]



65. Native reinforced bows. *Above*: Eastern Eskimo's bow of reindeer horn with sinew binding. *Below*: Sinew-bound bow from Eastern Siberia.

Further south the American Indian had a variety of woods to choose from and to some extent he copied the Asiatic composite bow by moulding a sinew backing round the wooden stave and enclosing it in an outer skin of bark or snakeskin. But it was still a comparatively crude weapon, and it lacked both the finish and the performance of the Asiatic prototype. Saxton Pope made the following analysis of Indian bows which were also tested for actual performance.

Tribe	*Length in inches*	*Wood*	*Backing*	*Pull in pounds*	*Range in yards*
Mohave	67	Willow	—	40	110
Luseño	55½	Willow	—	48	120
Navaho	44	Mesquite	sinew	45	150
Yurok	54	Yew	sinew	30	140
Yaqui	59½	Osage Orange	—	70	210
Yana	55	Yew	rawhide	48	205
Blackfoot (*a*)	47½	Ash	—	45	145
(*b*)	40	Hickory	sinew	40	155
Apache	41	White Hickory	sinew	28	120
Cheyenne	45	Ash	sinew	65	165
Hupa	47	Yew	sinew	40	150
Osage	47	*Bois d'arc*	—	40	95
Cree	44	Ash	—	40	150[96]

These figures were, of course, produced by one man from single specimens and cannot be taken as true representative performances. Nevertheless it is obvious that the Indian technique of constructing a composite bow did not compare with that of the Turks or Persians. The best range, it will be noted, was produced by a self-bow. Both the Crows and the Cheyennes are known to have made bows entirely from the horns of the elk or the Rocky Mountain sheep; but these again were effective up to a short range only.

However the Indian hunter has always made a point of getting as close to his prey as possible. Some of the first illustrations of Indian hunters engraved by Theodore de Bry for Le Moyne's *Travels in Florida* of 1591, show Florida natives with bows and arrows creeping up to deer wearing the skins and antlered heads of stag. In 1634 William Wood wrote of the Indians in New England:

For their shooting they be most desperate marksmen for a point blancke object, and if it may bee possible *Cornicum oculos configere* [to hit the eye of a crow] they will doe it; such is their celerity and dexterity in Artillerie, that they can smite the swift running Hinde and nimble winked Pigeon without a standing pause or left eyed blinking; they draw their Arrowes between the forefingers and the thumbe;[97] their bowes be quicke, but not very strong, not killing above six or seven score.[98]

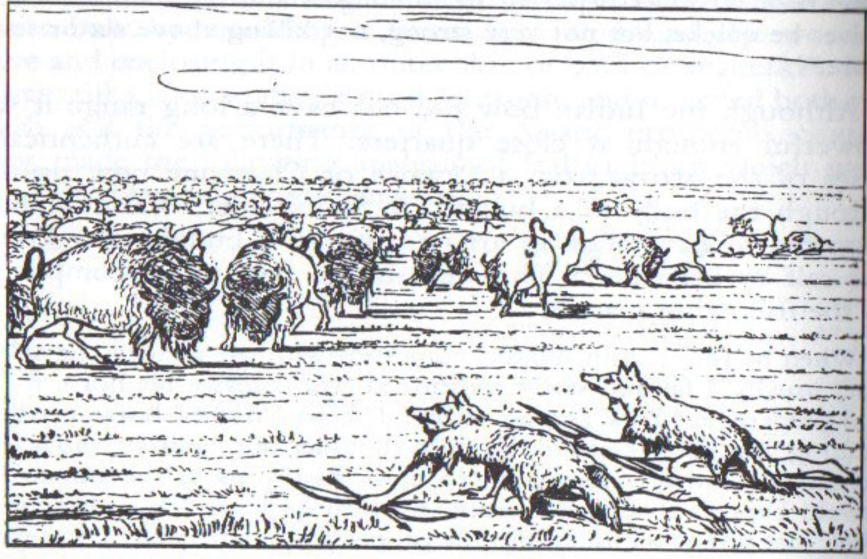
Although the Indian bow did not have a long range it was powerful enough at close quarters. There are authenticated cases of the arrow from a Pawnee or Cheyenne bow passing through the body of a buffalo. A Sioux chief, Wah-na-tah, is reported to have shot an arrow through a buffalo cow killing the calf by her side.[99] This devastating shot was accomplished in the following manner:

When he [the Indian hunter] comes up with the animals, he selects one, usually a fat and well-conditioned cow, presses his horse to her and prepares his bow and an arrow. The well-trained horse needs no guiding, but keeps close to the right shoulder of the bison, and a little behind it, so that it may not run upon the horns of the animal if it should happen to stop suddenly and turn its head. This plan, moreover, just brings the rider into the proper position to deliver his arrow in the most deadly manner, *i.e.* directing it just behind the shoulder. When an arrow is discharged by a practised hand, the bison falls

mortally wounded, and tenacious of life as it is, soon breathes its last. Leaving the arrow in the wound in order to mark the owner of the dead animal, the successful archer dashes on in pursuit of another animal and does not cease until he has expended all his store of arrows.[100]

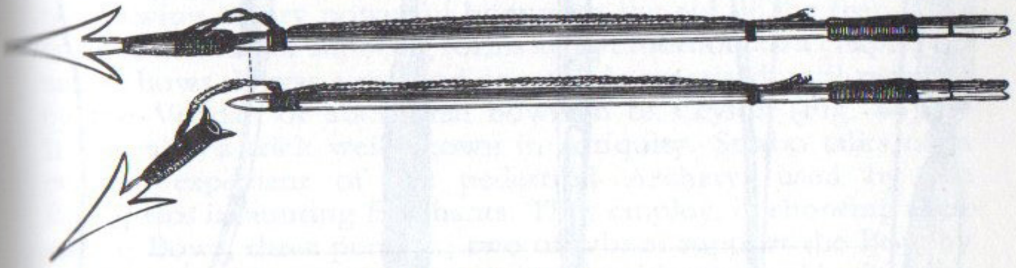
The Comanches are said to have placed the blades of their hunting arrows in the same plane as the notch for the string so that they could pass more easily between the ribs of an animal which are placed vertical.[101] The same effect could be obtained by holding the bow diagonally or nearly horizontal. Another close approach to the bison was achieved by Indian hunters donning the skins of wolves and crawling up to an unsuspecting herd. The Indian authority George Catlin (1796–1872) has left us drawings of both these methods of shooting the bison (Fig. 66).

The bows of South America were mostly of crude construction and short range. But these shortcomings were nearly always made up for by the cunning and dexterity of the hunter. Poisoned arrows were employed extensively and there was no lack of skill in close range work. One curious method of shooting up in the air against a ground target was prevalent in the north of the



66. North American Indians stalking buffalo under cover of wolves' skins. After the drawing by Catlin.

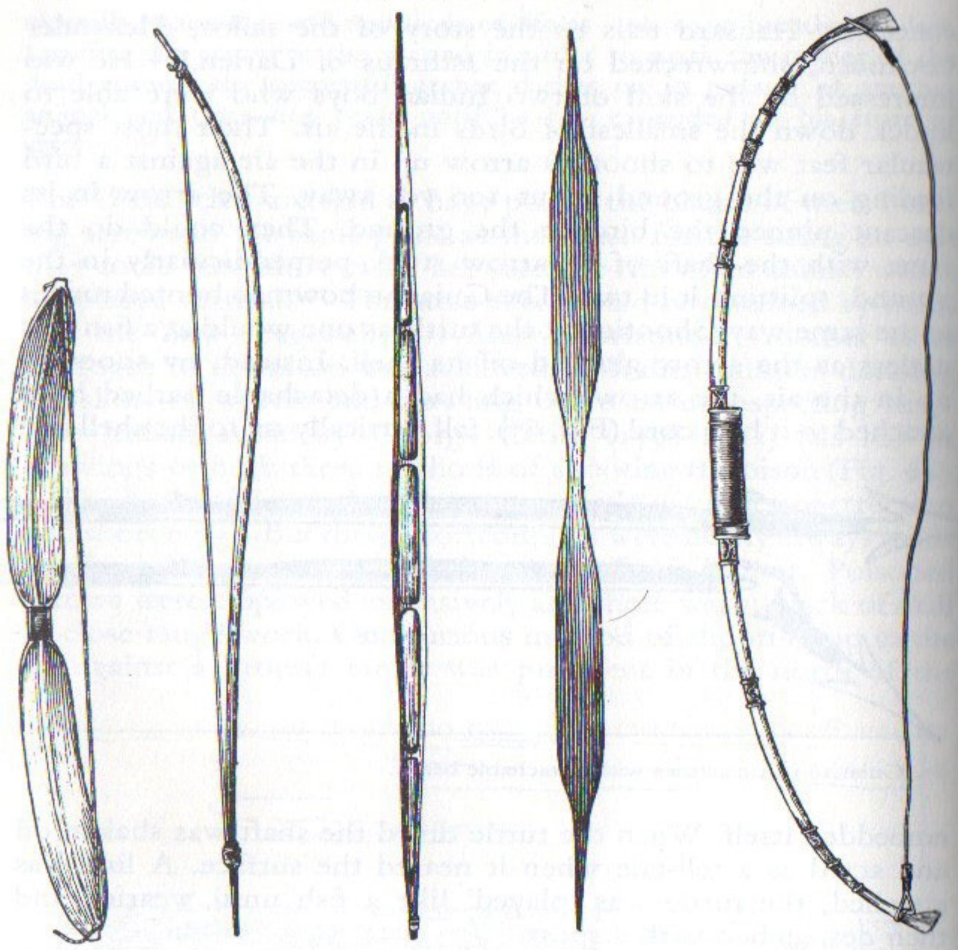
continent. Hansard tells us the story of the sailor, Alexander Cockburn, shipwrecked on the Isthmus of Darien.[102] He was impressed by the skill of two Indian boys who were able to knock down the smallest of birds in the air. Their most spectacular feat was to shoot an arrow up in the air against a bird feeding on the ground about 100 yd. away. The arrow in its descent pinned the bird to the ground. They could do the same with the shaft of an arrow stuck perpendicularly in the ground, splitting it in two. The Guianan bowman hunted turtles in the same way. Shooting at the turtle as one would at a fish was useless as the arrow glanced off its shell. Instead, by shooting up in the air, the arrow, which had a detachable barbed head attached to it by a cord (Fig. 67), fell vertically on to the shell and



67. Guianan turtle arrows with detachable heads.

embedded itself. When the turtle dived the shaft was shaken off and acted as a tell-tale when it neared the surface. A line was attached, the turtle was 'played' like a fish until wearied and then despatched with a spear.

Except in the Island of Java, the wooden bow was in universal use throughout the Pacific, south of the Tropic of Cancer and, with certain minor exceptions, across the entire African continent. Some bows were of curious shape. The Andaman Islands bow has the appearance of a two-bladed paddle tapering to a point at each end (Fig. 68). It is between 4 and 6 ft. long and is used as much for shooting fish as for the killing of the small game which inhabit the island. The bows made on the northern island have, for some reason, the upper limb much more bent than the lower. This is a characteristic shared by bows found in the New Hebrides. Another paddle-shaped bow, of smaller dimensions, has been found in south-east Africa (Fig. 68).

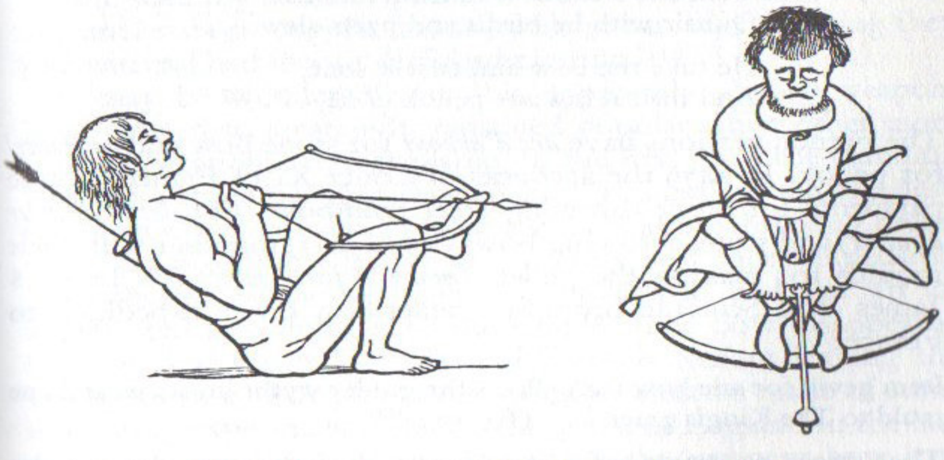


68. Native self-bows. *Left to right*: Paddle-shaped wood from Shiré River, East Africa; asymmetrical stave of wood, New Hebrides; bamboo stave, New Guinea; paddle-shaped wood, South Andaman; water-buffalo horn in two pieces, Java. This last bow is in its unreflexed state. From Longman's, *Archery*.

Java has been noted as an exception to the countries of the wooden self-bow and this is because it is regarded as the centre of production of the horn bow. The carabao or water buffalo from whose horns these bows were made is indigenous to most of South-East Asia so that the Javanese horn bow is not confined to that country. The horns of the Indian buffalo (sometimes reaching 6 ft.) were long enough to provide ample bow staves. They are spliced to a cylindrical handle at one end and at the

other fixed with stiff ears riveted in position (Fig. 68). The smallest of the horn bows was made by the African Bushmen of the Kalahari desert. The bow was a simple one made from a sliver of antelope horn from 12–20 in. long. The arrows were half this length and flightless, but the points were heavily poisoned. The horn bow also made an occasional appearance in India.[103] In Ceylon it was one of the most revered of weapons. The Sinhalese *Mahawanso* describes one of the chiefs of the army of Dutugaimunu, of 160 B.C., as combining all the virtues of his craft being at once a 'sound archer', who shot by ear when his target was unseen; a 'lightning archer' whose arrows were fast as thunderbolts; and a 'sand archer', who could send his shaft through a cart filled with sand.

This improbable sounding feat may have been accomplished by drawing a very powerful bow with the aid of the feet. This curious method of shooting forms an apt footnote to a chapter on native bows. It was a method or attitude practised until recently by the Veddah or aboriginal bowman of Ceylon (Fig. 69).[104] It was also a trick well known in antiquity. Strabo talks of 'a curious expedient of the pedestrial Archery, used by the Ethiopians in hunting Elephants. They employ, in shooting their strong Bows, three persons; two of whom support the Bow by pressing their feet against it; while a third is engaged in drawing



69. Foot bows. *Left*: Veddah aborigine (Ceylon) drawing bow. From J. E. Tennent's *Ceylon* (1859). *Right*: English foot archer. From the thirteenth-century *Luttrell Psalter* (B.M., Add. MS. 42130).

the string and directing the Arrow.' Xenophon wrote of the Carduchi (Kurds): 'They had Bows which were three Cubits long, and Arrows of two cubits. When they made use of these weapons, they placed their left foot on the bottom of the Bow, and by that method they drove their Arrows with great violence, piercing through the shields and corselets of his men; and as the Arrows were extremely large, were used by them as javelins.'[105]

Stone Bows

The hand bow designed to shoot stones or pellets was simply an ordinary bow stave fitted with two strings held apart by spacers or spreaders of wood, bone, or metal, one near each end. In the middle of the two strings was fastened a leather or woven pouch to hold the pellet. The stone bow was known in Europe at least as early as the fourteenth century. In 1327 the good citizens of London were plagued with hooligans armed with stone-throwing crossbows and bows (*balistas et arcus pro lapidibus*). With these bows they were reported shooting up the lanes and alleyways of the city with stones and clay pellets (*lapidas ac pelotes terreas*).[106] The poem, The *Buk of Alexander*, a Scottish translation from the French original probably written in the fourteenth century, has these references to the stone or pellet bow:

> With that, ane chyld besyde him went,
> With ane stain-bow in hand all bent
> Quhair with he birdis and pyets slew . . .
>
> He tuke the bow and taist it sone,
> And thairin hes ane pellok done, . . . [107]

The French versions have *arc d'arbour* for stone bow and *cailloucel* for pellok. In 1479 the accounts of Louix XI of France include payments for stone-throwing steel crossbows (*arbalestes d'acier à jalets*) and stone-throwing bows (*arcs à jalet*) together with their moulds for making the pellets (*moles à faire jalets*).[108] In 1538 James V of Scotland brought a pellet bow on an expedition to France:

> Item gevin for ane bow for pellocis the gidder wytht jm stanis and ane muld to The Kingis grace . . . vj frs. xv s.[109]

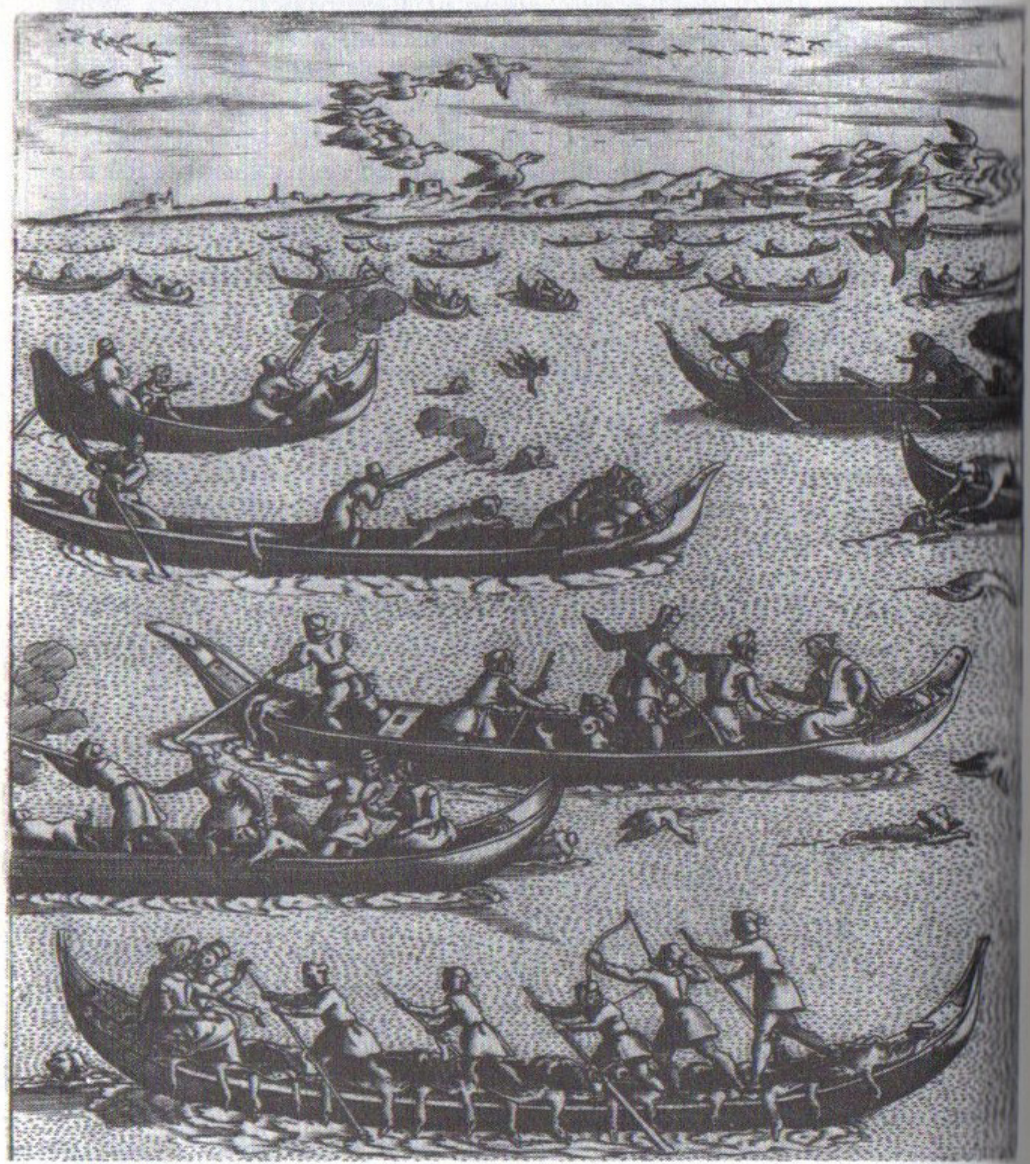
That great exponent of arms Henry VIII did not despise the humble stone bow. In 1532 his Privy Purse Expenses included an item of 8*s*. paid to Gwillim the French fletcher for 'pellets

for the stone bowe', presumably the one given him as a New Year's gift the year before.[110] When he died in 1547 the inventory of his armoury listed in the stores at Greenwich 'twoo stone bowes of Ewe' with a leather bag containing moulds to make pellets of lead or clay; and at Westminster were 'twoo Longe Bowes of Ewghe to shote stones in withe cases of Lether to them'.[111]

The stone bow had limited powers and was only suitable for the pursuit of light game and wild fowl. The lagoons of Venice were, in the sixteenth and seventeenth centuries the favourite hunting grounds of sportsmen armed with these bows. A painting of *c.* 1500 by Vittore Carpaccio shows ducks or cormorants being shot with these weapons.[112]

A fine illustration of shooting with the stone bow can be seen in the painting *La Caccia all'anatra* by Pietro Longhe in the Pinacoteca Querini Stampalia, Venice. The engraving in G. Franco's *Habiti d'huomini* of 1609 (Fig. 70) is extremely interesting as it shows that although sportsmen had by this date learnt the art of shooting flying with guns the stone bow (*archi da balle*) was still being used and—judging by the boat-load of fowl in the foreground—with conspicuous success. A European traveller on the west coast of Africa, early in the seventeenth century, reported great success with his shooting there: 'I have with my stone or pellet bow in two hours, killed twenty pigeons, even among the houses, which manner of shooting they [the natives] had in wonderful admiration.'[113]

It may be wondered why this apparently clumsy weapon, little more than a catapult, remained popular when other more effective weapons were available. In the first place the stunning blow of a stone brought down a bird without tearing the flesh as did an arrow or a bullet from a gun. A stone-throwing crossbow was no more effective and a great deal more expensive. Nevertheless as the shotgun was developed and the art of archery fell into decline, so the simple stone bow disappeared from all but the wilder parts of Europe. Before leaving the European stone bow, however, mention must be made of some interesting experiments which were made in England in the late eighteenth century towards converting the ordinary bow into either a stone bow or a trap bow. These were described by W. M. Moseley in *An Essay on Archery* in 1792:



70. Shooting flying birds with gun and stone bow (see lower boat) near Venice. This appears to be the first illustration of shooting flying. From G. Franco's *Habiti d'huomini* (1609).

There are contrivances by which small-shot and balls are discharged from the Bow, and by the assistance of a species of Arrow, (if we may venture to term it so) which is fixed on the Bow-string, by means of a perforation through one end, into which the String is passed. At the head of this rod is a tin ferrule, about three or four inches in length, and into which the shot are placed. It is usual to have a string on purpose for this kind of shooting, well wrapped in the middle with silk; and the Arrows slipped on, that the whole may be removed from the Bow at pleasure. When an apparatus thus fitted up, is discharged, the Arrow communicating the force impressed upon it by the String, to the shot, projects them with a velocity in proportion to the strength of the Bow made use of; but as the weight of the charge and the Arrow tend in a great degree to diminish the velocity of the body emitted we must conceive the effect much less powerful, than that of an Arrow shot from the same Bow.

In discharging balls, the same apparatus is made use of, except that instead of a tin ferrule, as in the former case, the Arrow has a weak spring on each side of the head, placed so as to press gently on the ball.

For the trap shot the bow was fitted up as before and the same arrow used as for the shot but this time it was fitted with:

four tin ferrules about an inch long each, instead of a single one. These are to be placed nearly parrellel, but not entirely so, as they are intended to make the charge diverge. A light silk net about four feet square, is to be prepared, having a small leaden bullet fixed on each corner; these bullets are to be put singly into each of the four tin ferrules, and in this state the whole may be carried into the field for use. On discharging the Bow, the balls are thrown out with violence, carrying the net with them, and at the same time expanding it; and should it be directed properly towards a partridge, or any other bird on the wing, the net will not fail to entangle and bring it to the ground.

Moseley's devices were, of course, adaptations of the old Arabic *midfa mudawwar* (see page 129).

In Asia the stone bow was of great antiquity. Signs from the 'picture writing' of the Shang dynasty (*c.* 1500–1028 B.C.) include what appears to be a representation of a bow whose string is fitted with a bag for a round pellet. A painting by Ch'ien Hsüan (A.D. 1235–90) in the British Museum, shows a young horseman holding a short rattan-wrapped bow with a single string, in the middle of which is a small circular pouch.[114] The Persian poem *Miftāh ul-Fuzalā* of 1471–2 mentions a bow

(*kamān-mihreh*) for shooting clay or wooden pellets.[115] In the seventeenth and eighteenth centuries the Asian firearm was not developed to the technical perfection of its European counterpart; the bow and arrow was still held in high esteem and the stone bow remained as its humble but no less effective associate. Persian and Turkish stone bows were often made of the same composite construction as the ordinary bow and were decorated with equal care.[116]

In India, Ceylon, Burma, and China the stone bow (*gulail*, *ghulel*, *gal dunna*) was a popular hunting weapon whose capabilities were noted with enthusiasm by European travellers and sportsmen. It was of much plainer construction and appearance than the Persian stone bow and was normally made from plain strips of bamboo between 3 and 5 ft. long. The handles of some Indian and Burmese bows are amusingly carved with animals and gargoyles, and lacquer design is applied to the stave.[117] Egerton describes delicately-made bows from Lahore painted with a gilt decoration on a red or green background, with the pellet held in a silken web.[118] Sometimes only one spreader used on the double-string fitting formed only part of the bowstring. Each bow had its individual peculiarities and had to be handled carefully. Many, on the instant of shooting, had to be moved or pivoted to the left to stop the missile hitting the left thumb, and so on. But they were all surprisingly effective. The weapon expert Henry Wilkinson, writing about the stone bow in 1841, reported that 'the natives can bring down birds in their flight at forty or fifty yards'.[119] The naturalist Henry Forbes stated: 'I have myself killed a squirrel at eighty yards with one of these primitive weapons, and in the hands of an expert marksman they are indeed dangerous and even deadly.'[120]

Perhaps the most interesting account of the Indian pellet bow appeared in a letter written by a British sportsman signing himself 'N', to the Editor of the *Sporting Magazine* in July 1830. He had, he wrote:

> killed some hundreds of birds on the wing with it, such as kites, crows, gulls, and parrots, many of them at the distance of fifty and sixty yards: and such is the rapidity with which a person practised in its use can shoot, that, on one occasion, I recollect having had three shots at a gull flying past me, missing with the first and second shot and killing him with the third.

> No aim is taken; the eye is kept steadily on the object, and the hand held as upright as possible. The babs, or pellets are made of blue or yellow clay mixed with a little oil, and gradually dried in the shade to prevent their cracking, or becoming too light. They should be made in a mould, and of a size larger than a musket-ball, but not heavier than a leaden ball of about twenty-four to the pound. One of these balls can be shot to the distance of a hundred and fifty yards; a musket ball will not go further than about one hundred and twenty; but a pistol ball, No. 24, may be thrown two hundred yards. Cast iron balls of the musket size answer well for practice.
>
> The pellet bow is well adapted for exercise in this damp climate, as it can always be practised within doors. A cloth of any kind hung up in a room will answer for a target, as the ball drops from it without noise or injury.

In 1822 John Murray reported seeing an unusual form of stone bow being used by the Patagonian tribe, the Abipones. This was a short bow, never over 3 ft. long, made of *neterge* wood with a flat string about 3 in. wide fashioned from liana bark or flattened bamboo. It was intended solely for shooting clay pellets at birds, the string being held flat at full draw.[121]

Although it has nothing to do with hunting no account of the stone bow would be complete without mention of its use by the guards who were stationed on the walls of the Siamese royal palace. Any passer-by who did not properly salute the royal residence was promptly peppered with pellets![122]

The Steel Bow

When one considers that the composite crossbow was eventually replaced by the steel variety in the seventeenth century it may be wondered why more attempts were not made to apply the same treatment to the ordinary bow. The two types of bow presented different problems of construction, however, and it is doubtful whether any steel bow of the same size as a composite bow could have been made to match the latter's elasticity and casting powers. In 1545 Roger Ascham made a neat analysis of the problems of using metal for bows in his *Toxophilus*:

> Scripture maketh mention of brasse bowes.[123] Iron bowes, and style bowes, haue bene of longe tyme, and also nowe are vsed among the Turkes; but yet they must nedes be vnprofitable. For yf brasse, yron or style, have theyr owne strength and pith in them, they be farre

above mannes strength: yf they be made meete for mannes strengthe theyr pithe is nothyng worth to shoote any shoote wyth all.[124]

The reference to Turkish steel bows is interesting because in the inventory of Henry VIII's armouries made in 1547 there is the following entry:

Itm Turquy bowes of stele . . . iiij^{xx} xviij.[125]

The 1543 Inventory of the famous armoury of the Gonzagas at Mantua contained only one metal bow. Although many of the other bows are described as Turkish, this bow is simply noted as made of iron (*uno archo de ferro*).[126] There were still advocates for the steel bow in England, in 1588, for, when the battle with the Spanish Armada was at its height, a plea was made to the Council to 're-introduce the bow, crossbow and steel bow as weapons terrible and unused by the enemy. The bow our national weapon, good at home but naught abroad, the crossbow flieth far and striketh forcibly but above all the steel bow which flieth 20 score yards and can be discharged twice as fast as the crossbow.'[127] It seems unlikely that all steel bows were imported from Turkey. Joseph Skelton, in fact, illustrated a curious, folding steel bow in the Meyrick Collection which Meyrick described as being German of the fifteenth century. The latter gave no reason for this assertion.[128]

The Turkish and Persian smiths who could fashion fine steel sword blades were capable of making a steel bow, but the majority of these bows still in existence are of Indian origin. The Indian steel bow can be traced back at least to the Mughal period (commencing A.D. 1526) and the *Agnipurana* says of it: 'It must have a small grip, and its middle portion is said to resemble the eyebrow of a lady. It is usually made in parts, or together, and is inlaid with gold.' There were two main groups of Indian steel bows. Those of the first group were made in one piece with the grip and ears of horn, wood, or ivory, rivetted to the metal stave. In the second group the limbs were made separate, screwing into the handle. Both types were often lavishly painted or damascened with silver and gold. Early specimens of these bows are hard to identify. All those in the Sandringham Collection, for instance, date to the nineteenth century.[129]

The Indian armourers also made a steel bow whose limbs were composed of double sprung wires. Of very similar appearance

but of different design are the two bows in the Pitt Rivers Collection, Oxford, which are between 2 and 2½ ft. long. These were the invention of that indefatigable protagonist of the powers of elasticity, Richard Edward Hodges. In 1849 he took out a British patent (No. 12,623) for 'Improvements in mechanical purchases which are also applicable in whole or in part to projectiles'. The patent mentions the possibility of hurling projectiles from tubes on the principle of a crossbow and Hodges did make some of these guns (see p. 209). The patent also illustrates a bow 18 in. long and made from a rigid metal pipe. The projection power was obtained not from the limbs of the bow but from the cord or bowstring which was made of '*vulcanised caoutchouc*', i.e. rubber, and was 9 in. long unstretched. A number of these catapult bows were made in Victorian times and were usually provided with a mahogany hand grip. Another object illustrated in the patent was a wooden ferrule or cup which could be held in the hand. This had an elastic cord capable of discharging a small arrow through the orifice.

Chapter Five

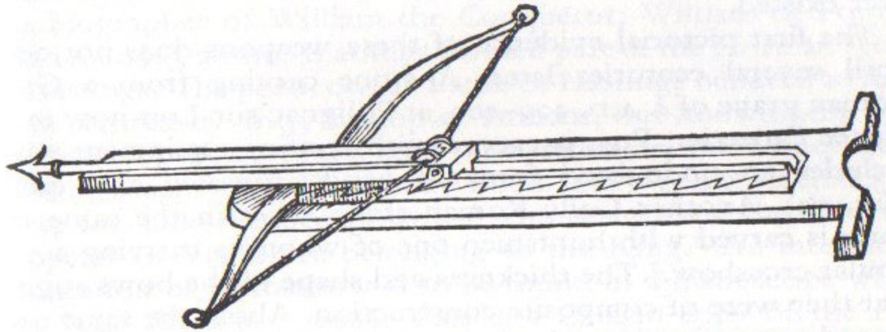
Crossbows

Early Crossbows
Basically the crossbow was a bow fixed at its middle to a stock or tiller set at right-angles to it. The bowstring could be pulled back until it was held in a notch or string-catch set in the stock. With the string held in the drawn position it was then possible to take aim and release the cord string by pressing a trigger in similar fashion to a gun. Very little skill was required to operate the crossbow compared with that necessary for the hand bow and the only physical effort lay in the bending or spanning of the short but strong bow. During the course of the years various mechanical contrivances were to be produced to make this a comparatively simple procedure.

The origins of the crossbow are obscure but there seems little doubt that the first archaeological and historical evidences of it are to be found in China. Chinese tomb reliefs dating to the Han dynasties (206 B.C.–A.D. 220) show a fully developed weapon with an ingenious form of lock or cord-release. Some of these locks, made of cast bronze, have been found on datable sites; one, from the tomb of Yu Wang at Schouchou, is attributed to 228 B.C., i.e from the end of the Chou dynasty.[1] In another grave at Chankuo was found the complete stock of a crossbow with its mechanism still in position. With it were two bows of laminated bamboo.[2] The mechanisms of these locks are drawn in detail in some early Chinese manuscripts on weapons and illustrate how it was designed to operate without springs.[3] Whilst the dating of some of these manuscripts is unreliable, at least one authenticated work, the *Shih Chi*, written about 100 B.C., reports the extensive use of the crossbow in the battle of Ma-ling in 341 B.C. Another passage in the book describes crossbow traps built to defend the

tomb of the great Emperor Ch'in Shih, who died in 210 B.C.[4] This reference to traps is interesting because some authorities consider that the idea of the crossbow may have come in the first place from the use of primitive bow traps in hunting.

The crossbow appears to have been introduced into Europe from the East during the Roman Empire, although the Romans themselves used the weapon mainly in the form of large siege engines, the *arcabalista*. A smaller form of crossbow was known to them, however, although it was still too big to be used comfortably as an infantry or sporting weapon and was normally shot from a rest. This was the *gastraphetes*, described by Heron of Alexandria in his *Belopoeica*, written probably in the first century



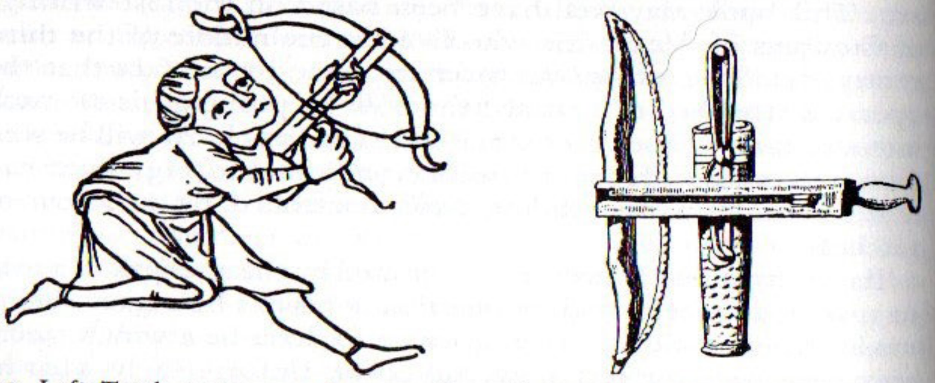
71. The Greco-Roman crossbow, the *gastraphetes*, as illustrated in *Heronis Ctesibii Belepoeeca* (1616).

A.D. This book may well have been based on the lost writings of Ctesibius of Alexandria who lived in the middle of the third centry B.C. The *gastraphetes* owes its name to the fact that the operator stretched or spanned the bow by pushing his stomach into a suitably-shaped butt at the end of the stock. As will be seen from the seventeeth-century reconstruction of it (Fig. 71) it had a stock made in two sliding parts controlled by a system of ratchets.

Its effectiveness, however, was limited by the strength of a man to span it, and Heron, who notes that in his day bows were being made stronger and stronger, goes on to describe a winch mechanism for bending very powerful bows. Unfortunately what he does not describe—at least in understandable terms—are the materials from which the bows were constructed. It is not clear

whether they were made from steel, bronze (used by Ctesibius in catapult springs), wood, or horn compositions. What evidence there is points to the last material.[5] Undoubtedly attempts were made in Heron's time to produce smaller, more portable bows. The Greek historian Arrian (*c.* A.D. 96–180), who at one time held a command in the Roman Army, described in his *Ars Tactica* some of the activities of cavalry: '. . . there are performed shootings of various kinds, with light darts or bolts, these being shot not from a bow, but from a "machine"'. This suggests some form of hand crossbow.[6] But the great classical sculptures, reliefs, bronzes, and mosaics which display all manner of weapons from hand slings to torsion-powered siege engines can be searched in vain for any sign that the crossbow, large or small, ever existed.

The first pictorial evidence of these weapons does not occur until several centuries later. A stone carving from a Gallo-Roman grave of *c.* A.D. 300–400, at Polignac-sur-Loir now in the Musée Crozetier, Puy, is carved with hunting equipment which includes an undoubted form of hand crossbow and quiver (Fig. 72). Another Gallo-Roman stone relief in the same museum is carved with huntsmen one of whom is carrying a very similar crossbow.[7] The thickness and shape of the bows suggest that they were of composite construction. About the same time, the military writer Vegetius in his *De Re Militari*, was advocating the crossbow as a weapon suitable for light troops. At this point in European history, then, the crossbow, with or without a winch



72. *Left*: Tenth-century crossbowman. From Haimo's *Book of Ezekiel* (Bibliothèque Nationale, Paris, MS. Lat. 12,302). *Right*: Detail from a Roman grave of *c.* A.D. 400 found at Polignac-sur-Loir, France.

spanner, was known and had been tried both as a military and a sporting weapon. But from the scarcity of signs of its use one must assume that it never attained any popularity. In fact, historical evidence of its use from *c.* A.D. 500 onwards is entirely absent until the appearance in the tenth century of the manuscript *Historia* by the French chronicler Richer. According to him the crossbow was used in the battles of Senlis and Verdun in 947 and 985 respectively. The tenth-century copy of the *Book of Ezekiel*, the work of the monk Haimo of Auxerre, includes probably the first paintings of crossbows (Fig. 72).

Medieval Crossbows

Although the Bayeux Tapestry does not include crossbowmen, the biographer of William the Conqueror, William of Poitiers (died *c.* 1090), affirms that they formed part of the Norman Army at Hastings. The poem on the Battle of Hastings believed to have been written by Guy, Bishop of Amiens, but known only by a doubtful twelfth-century copy also refers to the Conqueror's crossbowmen.[8] The Domesday Book (1085–6) also includes an entry for 'Odo the crossbowman' who is shown as the holder of property in Yorkshire belonging to the King.[9] An interesting illustration of a crossbow is to be found in a manuscript which has been dated to *c.* 1086. This is a Catalan copy of the *Four Riders of the Apocalypse*, from the Commentary by the Spanish monk Beatus of Liébana, first written in the eighth century. Now in the Cathedral Library, Burgo de Osma, it shows a small crossbow—the rider holds it in one hand—spanned with its bolt in position (Fig. 73).[10] In 1100 William Rufus was killed by what is believed to have been a crossbow bolt during a hunt in the New Forest. But up to this point there are still only few indications that the crossbow was regarded as being of any importance as a weapon in Europe. However, sometime between 1118 and 1148, the Byzantine Princess Anna Comnena wrote the *Alexiad* in which she described what to her was a new and terrible weapon:

> The cross-bow [*zangre* or *tzagra*] is a weapon of the barbarians, absolutely unknown to the Greeks. In order to stretch it one does not pull the string with the right hand while pushing the bow with the left away from the body; this instrument of war, which fires weapons to an enormous distance, has to be stretched by lying almost on one's back

73. Mounted crossbowman with his bow spanned and bolted. Detail from the *Four Riders of the Apocalypse*, a Catalan MS. of *c.* 1086 (*Cathedral Library, Burgo de Osma, Spain*).

each foot is pressed forcibly against the half-circles of the bow and the two hands tug at the bow string, pulling it with all one's strength towards the body. At the mid-point of the string is a groove, shaped like a cylinder cut in half and fitted to the string itself; it is about the length of a fair-sized arrow, extending from the string to the centre of the bow. Along this groove arrows of all kinds are fired. They are very short, but extremely thick with heavy iron tips. In the firing the string exerts tremendous violence and force, so that the missiles wherever they strike do not rebound; in fact they transfix a shield, cut through a heavy iron breastplate and resume their flight on the far side, so irresistible and violent is the discharge. An arrow of this type has been

known to make its way right through a bronze statue, and when fired at the wall of a very great town its point either protruded from the inner side or buried itself in the wall and disappeared altogether. Such is the crossbow, a truly diabolical machine.[11]

The Princess was not alone in her condemnation of the crossbow. In 1139 the Second Lateran Council under Pope Innocent II (1130–43) decreed in their 29th canon that the crossbow was 'a weapon hateful to God and unfit to be made use of among Christians' (*Artem illam mortiferam et Deo odibalem balistariorum et sagittariorum adversus Christianos et Catholicos exerceri de cetero sub anathemate prohibemus*).[12] The Crusaders had no compunction in using it against the infidels, however, and Richard I was one of many military leaders who encouraged its use. He is said to have personally killed several Saracens with the weapon during the siege of Askalon, only to fall a victim himself to a crossbow bolt during the siege of Chalus Castle in Normandy in 1199. The fact that the latter incident occurred in France shows what little effect the religious ban had. Pope Innocent III (1198–1216) found it necessary to renew the prohibition but by the beginning of the thirteenth century the decree was largely ignored and the crossbow quickly became a key weapon.

A study of the history of weapons shows that nearly all restrictions on the use of a particular arm were introduced either because it was a new and dreaded device or because it was a known weapon which had suddenly become effective in a new sphere of activity. The sixteenth-century firearm as an assassin's pocket pistol and the eighteenth-century airgun as a sniper's weapon are examples of the latter. The prohibitions directed against the crossbow in Europe during the twelfth century seem to suggest therefore, that as it was not a new discovery, some sudden improvement in its performance must have been effected. This may have been a better understanding and application of the method of constructing the composite bow. Against this theory is the fact that the records make it clear that many of the European crossbows continued to be made of wood. Perhaps it was the development of an easier release mechanism.

Exactly what form of lock or string-catch was used in these early European crossbows is not known. No complete specimens have been preserved and the manuscript illustrations quoted on

page 175 and others of the eleventh and twelfth centuries, beyond indicating that the bows had a long under-lever which was pressed upwards, are too lacking in detail to establish the type of release mechanism used.[13] In the Arabic manuscript *Tabsirat* written by Mardī ibn Alī al-Tarsūsī in *c.* 1180, crossbows are both described and illustrated.[14] Unfortunately neither description nor drawing make it clear what the mechanism was. One crossbow is said by Mardī to be spanned with the aid of a *laulab*. This word can mean lever, pulley, winch, windlass, spring, etc. The spanning of another crossbow is described as follows:

> The man places his feet in the inside of the bow and pulls with his back the belt where the hooks are until the string reaches the latch of the guide. He puts in there the key, then he takes the bow in his hands, places the bolt in the guide, lifts the key of the latch to allow it to pass in the inside of the guide; the latch turns because it is like a light pulley on an iron axle pinned to the two sides of the guide and it is revolved to bring it together with the key; the pulley turns, the string is released, the bolt is driven forward and it goes out at the end of the guide.

For 'guide' one can read the groove of the stock, and for 'key' trigger. This latch mechanism sounds like the revolving-nut type of release. The nut was a revolving spool of bone or ivory set into a socket on top of the stock. The upper edge of the nut was cut with a transverse notch for the string and at right-angles to it another groove was cut for the butt of the arrow. On the underside of the nut was an indentation sometimes reinforced with iron, into which the sear end of the trigger was fitted. When the bow was drawn the string was held in the notch of the nut which in turn was prevented from turning by the trigger. When the trigger was disengaged the pull of the string caused the nut to revolve and both string and arrow were released. In 1893 the skeleton of a man who had been buried with his crossbow, knife and tools was found at Southgrove Farm, Burbage in Wiltshire. Only fragments of the crossbow remained but they included the bone revolving nut. This grave dated to the late Roman occupation.[15] What appears to have been another bone crossbow nut was found in the crannog or lake dwelling at Buston near Kilmaurs in Scotland. Amongst associated material was a 6–7th century coin.[16] There seems little doubt, therefore, that the revolving-nut release was employed in crossbows in North Europe from an early date.

The earliest complete specimens of European crossbows are the remains of two wooden specimens found during the excavation of Castle Lillö near Kristianstad, Sweden, and a fourteenth-century wooden bow in the Schweizerisches Landesmuseum, Zürich.[17] All these have an entirely different lock mechanism, one which does not seem to have been described by any of the oriental treatises. The stock of these crossbows has a notch cut into it for the bowstring to catch in and a vertical hole is drilled up into it. A cylindrical peg sliding up and down this hole is connected to a lever below. When the lever is raised the peg pushes the string out of the notch.

It is possible that this form of crossbow release is represented in the paintings of crossbows in the tenth-century *Book of Ezekiel* mentioned on page 175, but the details are not clear enough to make this identification certain.[18] Although the hole-and-peg mechanism enabled a simple and cheap form of crossbow to be constructed almost entirely from wood, it is clear that it never attained the popularity of the revolving-nut type for normal sporting use. Nevertheless, under certain conditions—on board ship, for instance—it offered advantages. It was probably crossbows of this kind which were taken by Dutch and Portuguese sailors on their early voyages down the west coast of Africa in the fifteenth century. They were copied by the African tribes who until recently were still using similar bows for hunting (see p. 215). A larger edition of the hole-and-peg type of crossbow continued in use by Scandinavian whalers up to the beginning of this century. The whaling crossbow was a roughly-made, all-wooden weapon with a span of approximately four feet and was powerful enough for its purpose. It was spanned with a wooden bending lever (see p. 192) and shot a wooden bolt ending in an iron dart, something like a miniature harpoon.

The Mameluke archer, Taybughā, writing in 1368, mentions various national types of crossbows. 'The Franks have the *jarkh*, the *Maghrebis* (North Africans) the *laqshah*, the Persians and Turks the *zanbūrak* and Islam (the Mamelukes?) the *banduq*'.[19] Unfortunately, like so many other writers, he does not describe the mechanisms in detail. There is nothing, therefore, to suggest that any particular form of lock mechanism became suddenly popular and the reason why the superiority of the crossbow asserted itself during the Crusades remains obscure. Nevertheless,

there is little doubt that the French and English knights returning home brought back not only examples of the crossbow but men qualified to make them. The Mohammedans in Spain and Sicily also contributed to the spread of the weapon across Europe. By the beginning of the thirteenth century there are numerous references in the records of France and England to crossbows. They are described as being made of wood (*de fusto*), of yew (*de ifo*), of elm (*de omello*), and of horn (*de cornu*).[20] Even more interesting are the names of the crossbowmen. In 1205 Peter the Saracen, a crossbowman was sent to the Constable of Northampton, England, with a wage of 9*d*. a day.[21] In 1222 the names of crossbowmen drawing wages and allowances in the King's service seem to confirm that the majority were of foreign birth: Lambert de Cassel, Gerard de la Barre, Peter de Limoges, Nicholas de Limes, John le Graunt, William and Peter de Azay, Roger de Haya, Andrew de Pampelon, Luce Hispaniens, Philippus Britoni, etc.[22] The French, Spanish, and Saracen crossbow-makers, however, were jealous of their craft and for many years the method of constructing some types of bows particularly those of the composite type, was a closely guarded trade secret. Such was the mystery that surrounded the whole craft that at one time it was believed that the bows were made from the *phalli* of elephants.[23] As late as the fifteenth century King René of Anjou, sending a crossbow of an unusual construction to a Monsieur de Plesseys had to explain that it had been made by some Saracens of Barcelona who refused to teach the art to Christians.[24]

A careful dissection of a fifteenth-century composite crossbow revealed the complicated method of construction.[25] The core of the bow consisted of a layer of whalebone with a strip of yew on either side. This was encased in a shell of horseshoe section made of tendon mixed with some glutinous matter. The extremities of the bow were protected by curved pieces of horn. A fine bark, probably from birch, was applied overall apart from the horn tips. The appearance of the latter and the general lack of knowledge of the construction of the bow led to the belief that they were made entirely of horn. Hence the common classification of the period 'of horn'. Although horn was not apparently used as one of the main constituents in the crossbow examined above it was the ingredient normally employed for reinforcing the belly

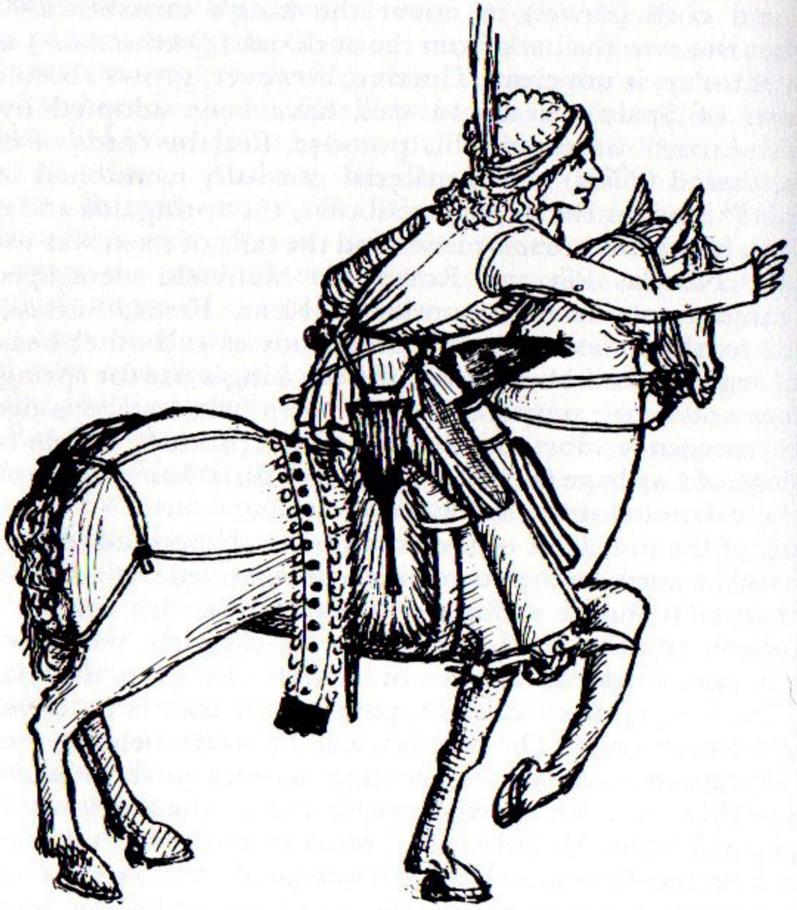
of the crossbow as it was for the same part of the hand bow. Thus, in 1240, the Sheriffs of London were instructed to provide the Constable of the Tower of London with sinew (*nervos*), horn (*cornu*), and glue (*glu*) for the construction of crossbows.[26]

A list of materials issued in 1358 to Robert l'Artilleur of Rouen, for the same purpose, included yew, wax, resinous pitch, tallow, charcoal, glue, shredded ox sinew, rams' horns, and varnish.[27] Whalebone, it will be noted, is not included; the varnish was presumably used to coat the limbs of the bow instead of bark. In 1226 Roger, Henry III's crossbowman was recorded buying glue and cork (*cortice*) to cover the king's crossbows,[28] but whether this was the bark from the cork oak (*Quercus suber*) as we know it today, is not clear. The tree, however, grows abundantly in parts of Spain and could well have been adopted by the Spanish crossbowmen for this purpose. For the cords of crossbows, thread (*filum*) is the material normally mentioned in the records.[29] But for the larger crossbows, the springalds and other engines, hair from horses' manes and the tails of oxen was used.[30] In 1337 Nikolas Pik and Robert de Manyfeld were specially appointed to scour the counties of Kent, Essex, Surrey, and Sussex to obtain 'as much hair of carthorses and other beasts of the plough as shall be required for the king's use for springalds, engines and other purposes'.[31] Women's hair was considered a good emergency substitute for the animal product, and in fact at the siege of Carthage (147–146 B.C.) slave girls' hair was employed for the catapults of the defenders.[32]

One of the problems of the crossbow was the need to keep the bow and its cord—which could only be removed with difficulty—weatherproof, hence the use of bark and varnish for the bow. Protection for the cord was given by carrying the bow in a special case made of canvas or leather. In 1239 the Earl of Lincoln, Constable of Chester, paid 5*s*. for canvas to cover the King's crossbows.[33] These covers can be seen shielding the bow and strings in some of the sporting secenes in the *Hausbuch* of *c*. 1480 (Fig. 74). An actual example was in the Armoury of the Emperor Charles V and is illustrated in the series of drawings known as the *Inventario Iluminado* executed in *c*. 1540. This particular cover fitted over the whole of the crossbow and was apparently of plain appearance. Some covers, however, did not lack decoration. When Louis de Bruges or the Lord of

Gruthuyse, as his chronicler calls him, visited Edward IV on a special mission from Charles of Burgundy, the English king presented him with 'a Royall Crosbowe, the stryne of silke, the case covered with velvette of the Kinges' collour and his armes and bagges [badges] thereapon'.[34] When on horseback the crossbow could be carried slung from a baldric or shoulder belt.[35]

The *raison d'être* of the crossbow was its short heavy arrow known as a bolt or quarrel. The shafts were usually about 1 ft.



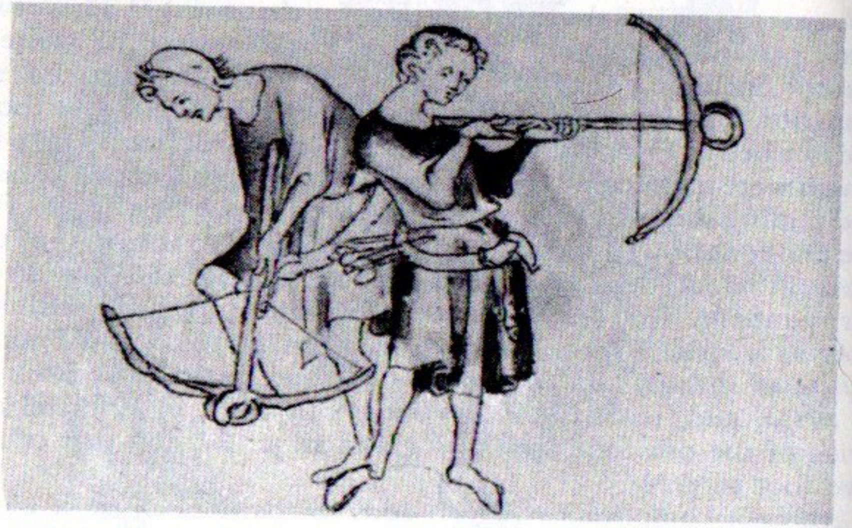
74. Mounted crossbowman, a quiver at his side and a cover over his bow. Detail from the fifteenth-century *Hausbuch*.

long and about $\frac{1}{2}$–$\frac{3}{4}$ in. in diameter. They were made of seasoned yew, ash, or beech and were winged with thin strips of wood, leather, skin, horn, and sometimes brass.[36] The iron heads were of different shapes according to whether a military or sporting target was being attacked. For the former category sharply pointed heads or square heads with four small points one at each corner, which did not easily glance off armour, were the most used. For sporting purposes a variety of shapes were to be developed to suit the different sizes of game (see p. 193). For the construction of quarrels a plentiful supply of wood and iron was necessary and one of the great areas of manufacture in England was in the Forest of Dean, with the castle of St. Briavels as its administrative centre and storehouse. Total output here from 1223 to 1293, mainly by the family of de Malemort has been estimated at nearly a million pieces,[37] a figure which gives some idea of the rise to popularity of the crossbow at this time.

The many references to the crossbow in the thirteenth century also show that a number of different types of bow were in use. Those referring to the two main kinds of bow materials, wood and horn, have already been mentioned. But by far the greatest distinction made in the records is between crossbows for one foot (*ad unum pedem*) and those for two feet (*ad duos pedes*).[38] These two basic patterns are found throughout the literature of western Europe including that of Spain.[39] The generally accepted explanation for these two terms is that the two-foot bows are those as described by Princess Anna Comnena and Mardī (see pp. 175–8), which were spanned by the bowman placing both feet on the bow and pulling the cord back with his hands or with belt hooks. For the one-foot bows a metal stirrup was fastened to the front of the stock in which the foot could be placed to hold the bow down for spanning. This stirrup is often mentioned to distinguish the bow as a special type. Thus we have, in England and France, *balista ad stritum*, *ad stripodium*, *ad stapham*, in Italy, *de strevo* or *de strepa*, and, in Spain, *de estribera*.[40] In 1305, in England the price of the one-foot bow was given as 3*s.* 6*d.* and that of the two-foot as 5*s.*[41]

Another complication which adds to the difficulties of interpreting contemporary terms is the fact that by the thirteenth century, various mechanical aids were being introduced to help a man span a strong crossbow. The use of a winch or windlass

was known to the Romans and this form of mechanism is apparently conveyed by the terms *ad turnas*, *de torno*, *ad viceas*, *arbalète-à-tours*, etc., which are met with in the thirteenth- and fourteenth-century records in England and France. No specimens of these early windlasses have been preserved and contemporary illustrations give only a general idea of their working. A much simpler device and—judging by the frequency with which it appears in illustrations—the most popular of early spanners was the metal hook. At first it was probably held in the hand, then it was attached to the belt, and it is in this form that it is usually depicted. Using this hook the crossbowman could either hook the cord to his belt and push downwards on the stirrup or, with the bow held firmly to the ground by the stirrup, bend down and place the hook on the cord. The act of straightening the back and legs was then sufficient to pull the cord back to the nut. Illustrations of its use can be seen in the *Luttrell Psalter*[42] of *c.* 1340 and the early-fourteenth-century *Queen Mary's Psalter*[43] (Fig. 75). In the Bohemian *Velislav Bible* of *c.* 1340 soldiers wearing the device have the strap threaded through a slot in the belt to maintain its position in front.[44] It is difficult to find a con-



75. Hunters with wooden crossbows. One shoots at a bird in a tree, the other spans his bow with his foot placed in the stirrup and a belt hook clipped to the string. Detail from the fourteenth-century *Queen Mary's Psalter* (B.M., Royal MS. 2 B VII, f. 162v.).

temporary term for the belt hook but in some German records of the fourteenth century one finds the word *Rückarmbrust*, a pull or snatch crossbow, and it is possible that this was a bow spanned by the belt hook.

With improved methods of construction and with the aid of such mechanical devices the crossbow became an increasingly important weapon of war. As a sporting weapon, however, the crossbow still did not rank high. The medieval hunter preferred to take his game by pursuing it on foot or on horseback with well-trained hounds, the final killing of the beast, when brought to bay, being accomplished with spear or sword at close quarters. It is noticeable that the fourteenth-century editions of the hunting work *Le Livre du Roy Modus* contain no pictorial or textual references to the crossbow, and the early fourteenth-century manuscript *Queen Mary's Psalter*, whilst fully illustrating the work of hounds and the use of the bow, includes only one drawing of crossbows which are being employed against a sitting target—a bird in a tree.

Introduction of Steel Crossbows

Early in the fourteenth century, however, there came a new development which brought the manufacture of the crossbow into the hands of the smiths and armourers. This was the introduction of the steel crossbow.[45] No longer were sportsmen dependent on the specialized skills of the select few who could make the composite bow. The steel bow, secured to its stock at first by the usual thonging and then later by iron stays, increased the range of the crossbow and encouraged the construction of both larger and smaller versions of the bow. At certain ranges a higher velocity and deeper penetration were produced. Everything seemed to point in favour of the new weapon, but, as with other inventions, many sportsmen did not take kindly to the new type of bow; many still preferred the old composite kind. There were also difficulties in the manufacture and tempering of the steel. Some of the teething troubles are revealed in the letter sent by John Paston (1444–1503), defending the castle of Caister, Norfolk, to his brother John in 1469:

> Also, syr, we pore sanz deners of Caster have brook iii or iiii stelle bowys; wherfor we beseche yow, and ther be eny maker of steelle

bowys in London whyche is verry kunnyng, that ye wyll send me woord, and I shall send yow the bowys that be brokyn whyche be your owne greet bowe, and Roberd Jaksonys bowe, and Johon Pampyng[ys] bowe. Thes iii have cast so many calvys that they shall never cast qwarellys tyll they be new mad.[46]

The phrase 'cast so many calvys [calves]' probably meant lost so many parts.

Gilles le Bouvier wrote in 1455 that crossbows of horn 'do not break when they are frozen, for the colder it is the stronger they are'.[47] For the same reason Maximilian I (1459–1519) recommended the use of a horn rather than a steel crossbow for hunting chamois (Fig. 76). This initial distrust of the steel bow is brought out by the episode portrayed on Pl. 34 of *Theuerdank* (1517). In this the villain Unfalo lends the hero Theuerdank (Maximilian) a steel crossbow which promptly breaks when used, ripping the cap from his head and severely wounding one of his servants. But it was with a steel crossbow that Maximilian won a match against Yorg Purgkhardt, a skilled marksman with the handgun, by killing a chamois at a distance of 100 *Klafter*, or over 200 yd.[48] An example of the extreme range of the crossbow is to be found in the story of the two feuding brothers, the fifteenth-century knights Hans and Ulrich of Frundsberg who lived in neighbouring castles in the Tyrol. At the height of their quarrel, Hans, standing at a window in his castle, was killed by Ulrich shooting a crossbow from his castle which was about 450–500 yd. away.[49]

Spanning Devices

By the end of the fifteenth century the crossbow, now more compact and easily carried on horseback, was being used extensively in the pursuit of game and various mechanical devices were designed to span the stronger types of bow. They can be divided into five classes: belt and hook, windlass, screw and jack, cranequin, and goat's foot lever.

The metal hook, single or bifurcated, hanging by a short strap from the belt was the simplest and probably the earliest of the spanning tools. Early examples have been discussed on page 184. Konrad Kyeser's manuscript *Bellifortis* of *c.* 1405,[50] suggests a more sophisticated form of hook. Instead of a strap, an iron rectangular box hangs from the belt. The hook with its stem cut into ratchets can be adjusted up or down in this box to allow for

76. The Emperor Maximilian I shooting chamois with a composite crossbow. Detail from *Der Weisskunig* (1526).

differences in the height of the wearer or the distance of the crossbow's draw. The belt hook depended on the strength of a man's legs and back, and to ease some of the strain a useful modification was introduced, probably at the beginning of the fifteenth century. The hook was attached to a pulley which ran on a rope, one end of which was fastened to the belt and the other to the stock of the crossbow. A bowman using this contrivance, which is sometimes called a 'Samson's Belt', appears in the painting *The Martyrdom of St. Sebastian*, by Antonio Pollajuolo of 1475 in the National Gallery, London. From the huntsman's point of view it was essential to keep his equipment as simple and light as possible. A fifteenth-century manuscript version of Gaston Phoebus in the National Library, Paris, shows only the simple belt hook in use. Even when equipped with a pulley, however, the belt hook was not suitable for spanning the strongest crossbows. The most effective spanning device for this class of bow was the windlass.

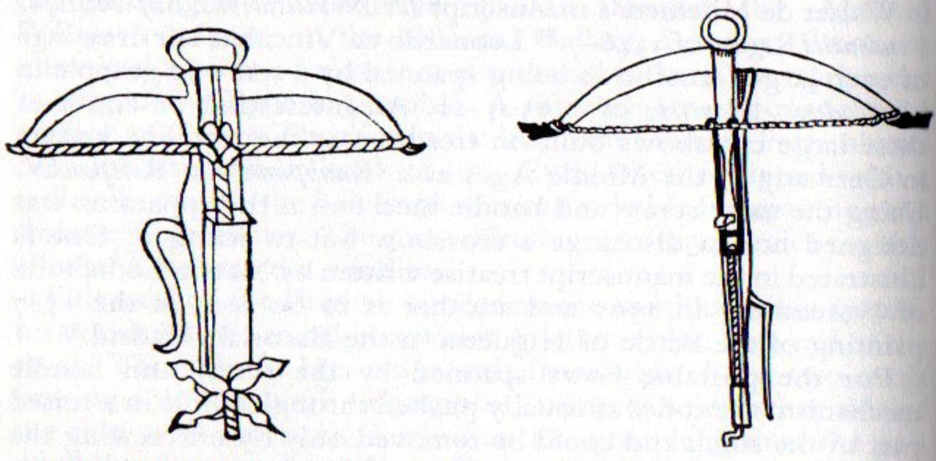
Often called the English winder on the continent, this apparatus consisted of a metal box which fitted over the butt end of the stock. Through the box ran an axle from which hung two cords bearing a double hook or grapple. Strong handles either side of the axle were sufficient to wind up the grapple against the pull of all but the strongest of steel bows. A simple form of windlass is shown in the *Bellifortis*. The later and more sophisticated forms of windlasses had double and treble systems of pulleys and cords which, although making the task of spanning easy, increased the complexity and weight to a point when the whole apparatus became too cumbersome to be carried on the hunt. Well might the executors of Richard Toky, deceased in 1391, describe his crossbow and windlass (valued at 2*s*.) as 'One arblast with the takell'.[51] The windlass, in fact, was most suitable for the large military and target crossbows. In an inventory of the effects of Sir John Falstaff in 1459 appears the following entry: 'Item, iij grete Crosbowes of stele with one grete dowble wyndas ther too.'[52]

One of the earliest means of spanning a crossbow was by a screw and handle mechanism. This can be traced back to the early siege bows. The grapple of this device was connected to the end of a long screwed rod threaded through or running along the top of the stock. Attached to the end of the screw and protruding in awkward fashion from the butt was a suitable handle. Turning the handle, which could revolve but not move forward, caused the rod to withdraw carrying with it the grapple and the bowstring. As soon as the latter had caught on the nut the handle could be spun back and the grapple disengaged. On the large crossbows fitted in this way the spanning mechanism was built into the stock as a permanent feature. An example of this type of crossbow being discharged from a trestle support is illustrated in Walter de Milemete's manuscript *De Nobilitatibus, Sapientiis, et Prudentiis Regum* of 1326–7.[53] Leonardo da Vinci has left drawings of even larger crossbows being spanned by a screwed grapple in his *Codex Atlanticus* of *c.* 1505–10. An interesting off-shoot of these large crossbows built on trestles was the machine known in Germany in the Middle Ages as a '*Raubpank*' or '*Reispankh*'. Using the same screw and handle mechanism the apparatus was designed not to discharge a crossbow but to string it. One is illustrated in the manuscript treatise written by Martin Löffelholtz of Nuremberg in 1505 and another is to be seen in the 1587 painting of the Battle of Higuerta in the Escorial, Madrid.[54]

For the portable bows spanned by the screw and handle mechanism the rod was usually pushed through a hole in a raised part of the stock and could be removed only by unscrewing the handle. There are few illustrations of hand crossbows of this construction. One appears in Valturius's *De Re Militari* of 1472 (Fig. 77). The main disadvantage of this screw and handle spanner was that it had to be taken to pieces each time it was put on or taken off the bow. An interesting variation of the spanner is illustrated in the *Bellifortis*. In this the screwed rod was threaded through the top of a metal box which was clipped to the butt end of the stock like the box of a windlass. The front end of the rod revolved freely in the base of a long double hook which reached down to the bowstring. At the other end an integral handle was turned to withdraw the screw and pull back the string to the required cocked position. Once there the spanner could be disengaged and taken off the bow in one piece (Fig. 77). With this design, however, the spanner had to be made almost as long as the bow it served and was a correspondingly awkward accessory to carry around. Small pistol-size models of the screw and handle crossbows were also made. These were usually of all-metal construction, the spanning action being contrived by turning a wing

nut. Three fine specimens (*balestrino*) are in the Armeria Reale, Turin (Nos. L. 10–12). Perhaps rightly they won the reputation of being assassins' weapons.

The spanning device which, whilst utilizing the strong and reliable action of the screwed grapple, was both quick to manipulate and convenient to carry was the cranequin. This was based on the principle of the rack and pinion mechanism. The rack or toothed bar was furnished with a grapple at one end and ran

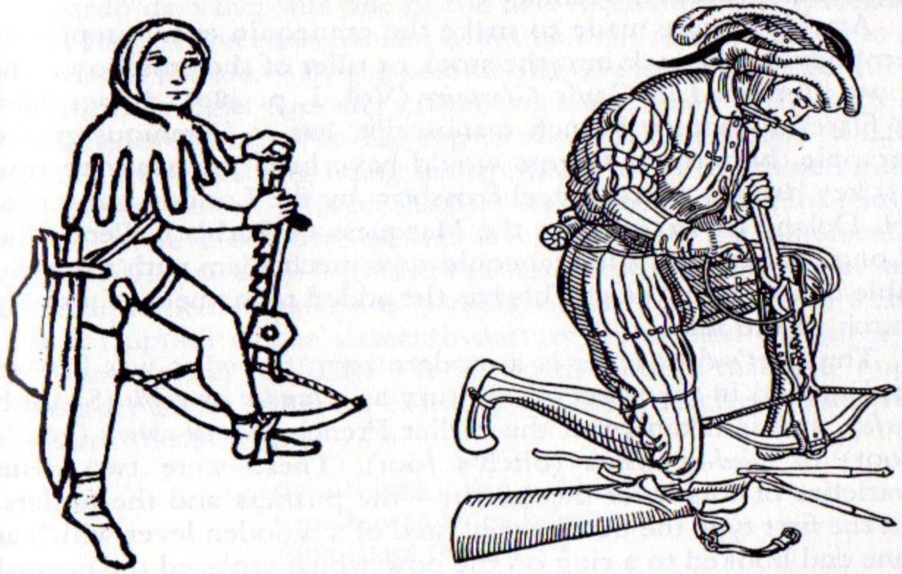


77. Screw and handle crossbows. *Left*: From Valturius, *De Re Militari* (1472). *Right*: From Kyeser's *Bellifortis* of *c.* 1405.

through a metal box which housed the gears. The gear wheels, usually one large and one small, could be connected either in horizontal or vertical arrangement and were propelled by a suitable handle. The box was held to the stock by a strong cord loop which passed over the butt until stopped by a transverse iron bolt projecting either side about 4–6 in. behind the nut.

The origin of the cranequin, like so many other arms accessories, is obscure. The word is the French version for what was known in Germany as '*Armbrustwinde*'; in Sweden as '*stålbågekran*'; and in sixteenth-century England as 'a rack'. Modern writers sometimes refer to it as the German winder and, in fact, Gay's *Glossaire* (Vol. I, p. 488) gives a 1440 reference to '*crannequins fait en Nuremberg*'. But an earlier reference is to be found in a list of stores belonging to the English army at Rouen in 1435 which describes them as French. The entry reads: '*Item, quinque instrumenta, dicta Crannequins Gallice*'.[55] Amongst the Scotsmen serving

in France in 1450 were soldiers described as '*Cranequiniers*' and '*crannequiniers à croq*'.[56] The first illustrations of the cranequin appear in the fourteenth century. A manuscript translation of Livy, *La Prima Deca in Volgare*, dated 1373, shows a crossbowman with a toothed bar and geared handle hanging from his belt.[57] The German manuscript *Feuerwerk Buch*, of *c.* 1440, in the Tower of London Armouries shows a crossbowman using a cranequin with a long straight handle (Fig. 78). In the painting *Der*



78. Cranequins. *Left*: with a straight handle, from a fifteenth-century *Feuerwerkbuch* (Tower of London Armouries). *Right*: with a curved handle, after the painting *Der Sebastians Altar* by Hans Holbein the Elder, *c.* 1516, in the Alte Pinakothek, Munich.

Sebastians Altar by Hans Holbein the Elder in the Alte Pinakothek, Munich, the crossbowman can be seen spanning his bow with a cranequin whose handle is curved into a semi-circle (Fig. 78). Another painting representing the martyrdom of St. Sebastian, painted in 1514, was formerly in the Church of St. Elizabeth at Marburg in Prussia.[58] This also showed a similar action.

Although not exactly light—the weight varied between 3–6 lb. —the cranequin was a quick and compact device which had an immediate appeal to huntsmen. It was also strong enough to

span the stocky powerful hunting crossbows which became immensely popular in the sixteenth century. The convenience with which it could be carried slung from a belt is illustrated by the charming woodcut of a sportsman shooting birds in P. de Crescentiis's, *De Omnibus Agriculturae* of 1548. Serving huntsmen with cranequins in hand can be seen waiting on their masters in such hunting paintings as Lucas Cranach's *The Stag Hunt of the Elector Frederick the Wise*, 1529, in the Kunsthistorisches Museum, Vienna.

Attempts were made to make the cranequin even simpler by embodying the rack into the stock or tiller of the crossbow. The bow illustrated in Gay's *Glossaire* (Vol. I, p. 480), drawn from a fifteenth-century French manuscript, has an ingenious geared grapple, but strong fingers would have been necessary to turn its key handle. A large steel crossbow by the London gunmaker H. Delany (*c.* 1715–45) in the Marquess of Bath's Collection at Longleat has a built-in cranequin-type mechanism with a detachable handle at the side. This has the added refinement of a safety catch to the release.

The goat's-foot lever is a modern term for what was known in England in the sixteenth century as a *bender* or *gaffle* (Spanish *gafa*), and is taken from the earlier French *pied-de-chèvre* (goat's foot) or *pied-de-chienne* (bitch's foot). There were two main varieties of this lever mechanism—the pushers and the pullers. In the first type the bender consisted of a wooden lever which at one end hooked to a ring on the bow which replaced the normal stirrup. Hinged about a third of the way up the lever was a smaller lever ending in a notched fork which fitted over the bowstring. When the main lever of the bender was pushed towards the butt, the smaller lever pushed the bow string up into the nut. Although it was a very simple gadget the resistance of the string being pressed against the stock added to the effort needed to operate it.

The second type of bender, nearly always of metal construction, had a smaller main lever which ended in two large curved prongs. Just above the prongs hung the grapple made of two hooks. With the grapple hooked on to the string, the two prongs of the lever were placed behind the protruding ends of a bolt fixed transversely across the stock behind the nut. The lever was then pulled back bringing the bowstring with it. It can be seen in

use in the painting of *The Martyrdom of St. Sebastian* by Luca Signorelli (1450–1523) in the Pinacotheca, Città di Castello, Italy.[59]

The device was based on the lever and fulcrum theory and there was a limit to the load that it could move. For this reason it was used mainly on the lighter sporting crossbows, especially on the stone throwers (see p. 205). In the 'Crosbowe Chambre' at Calais in 1547 were 'benders to bende small crossbowes'.[60] Leonardo da Vinci was one of the first mechanics to appreciate that a hinged lever mechanism could be built into the stock as a permanent feature.[61] By the second half of the sixteenth century a number of light sporting crossbows were being made with a bending lever hinged to the top of the stock, the hook which grasped the bowstring being incorporated into a combined lock and trigger action. This mechanism was to be adopted for many of the stone crossbows of the seventeenth to the nineteenth centuries (see p. 207). Light bows using some form of bender are often described nowadays as 'prodds' or 'latches'. The first word is a corruption of the sixteenth-century 'rodd' and the latter a mistranscription of 'lathe'. It is worth noting that the 1547 Inventory of the crossbow chamber at Calais, referred to above, contains these entries:

> Crossbowes called rodds
> Crossbowes called lathes
> Windlasses for them.[62]

That a windlass was considered necessary seems to suggest that the words rodd and lathe were used contemporarily to describe a larger kind of crossbow than they are now.

Bolts or Quarrels

The word quarrel comes from the French *quarreau* which in turn is derived from *carré* meaning squared. The last description could be applied to the heavy square-headed bolts preferred by many crossbowmen when attacking men in armour. This square bolt and the heavy pointed bolt constituted the main armoury of the military. More variety was shown in the design of bolts intended for the hunt. These can be divided into three main classes, very similar in effect to those used with the hand bow; barbed, forked, and blunt.

The large barbed bolt, or *angell-hede* as it was known, was the standard arrow used against large game like deer and boar. Fifteenth-century editions of Gaston de Foix's *Livre de Chasse* show this type of bolt very clearly. The measurements laid down by Gaston for these barbed heads were five fingers in length and four in width. There was no standard for the second group of bolts, the forked heads. On some examples the two forks were wide apart with a wide concave cutting edge lying between. Others had small and angular forks. The purpose of the design was twofold. First a bolt with this head was less likely to glance off the hide of an animal and secondly the shape was ideal for the practice of hamstringing an animal. In Lucas Cranach's painting of *The Stag Hunt of the Elector Frederick the Wise* in the Kunsthistorisches Museum, Vienna, no less a hunter than the Emperor Maximilian I can be seen hidden in a thicket applying a *forker* to his crossbow whilst waiting for stags who are being driven into range from across a river. In *Der Weisskunig* he is shown shooting a forked bolt whilst on horseback (Fig. 79). Maximilian's great admirer Henry VIII also set store in this kind of bolt, and there are many references to his fletcher supplying them. In August 1530 his Privy Purse Accounts include the following entry:

> Itm the xix daye paied to a woman in rewarde that gave the King forked hedds for his Crosbowe . . . xv^{s}.[63]

Another type of bolt which was often used to hamstring game had a chisel-shaped head. But this was also used against large birds like wild geese. In an Italian medical manuscript, *Tacuinum Sanitatis*, of the end of the fourteenth century, an illustration shows a crossbowman shooting at crane with this type of head.[64] Crossbow bolts with crescent-shaped heads up to a foot wide (*rävknivar*) were used in fox traps in Scandinavia during the eighteenth and nineteenth centuries.[65]

The normal type of bolt employed against birds and smaller game like rabbits was of the blunt kind with a flat or domed head. Known in France from an early date as the *bougon* it stunned or killed the quarry without tearing the flesh or damaging the fur or plumage. It also seems to have been the favourite vehicle for many of the charms and potions recommended by writers of the fifteenth and sixteenth centuries who were firm believers in the

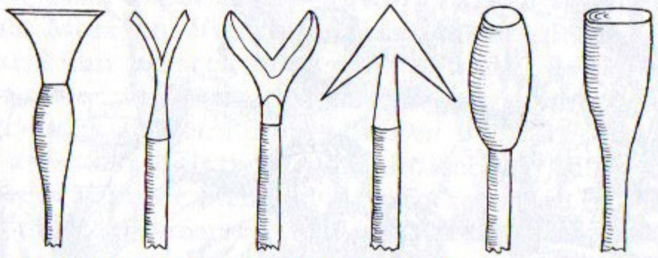
power of magic in the hunt. Konrad Kyeser in his *Bellifortis* of *c.* 1405 illustrates three blunt-headed crossbow bolts. The first he recommended should be hollowed out, filled with axle grease and fitted with an egg which contains no white, 'and with this you will be able to hit anything'. The second one he suggested should have the heart of a bat inserted in its shaft: 'then look at what ever mark you will, you will instantly be able to hit it'. The third bolt was of a well-known design, the whistling arrow, its head being pierced with holes 'so that it can suck in air'. Other hunters besides Kyeser believed that the whistling arrow caused some

79. The Emperor Maximilian I shooting with composite crossbow and forked bolt. Detail from *Der Weisskunig* (1526).

animals to stand transfixed and to turn their heads towards the sound. It could also be used with impressive effect if a body of archers shot what might be termed a *feu-de-joie*.

The Spanish gunmaker Alonso Martínez del Espinar in his book *Arte de Ballestería y Montería*, published in 1644, describes other forms of bolt:

> The arrows of the finest kind are called 'Jaras' because they are made of Jara wood. They will strike at 150 paces or more. These are anointed with a poison called 'The Crossbowman's herb'. This kind of arrow is smeared with the juice of this plant from the neck of its iron point for five or six finger-breadths down. Then the arrow is covered with a little strip of very thin linen, which wraps the shaft round and round and



80. Crossbow bolts. *Left to right*: Chisel head for hamstringing game; two forked heads; broad head or 'angell hedge'; two blunt heads of wood, the first with an iron cap.

> adheres to it over the poison without the need of any tying. The head of this arrow is of steel, square and pointed, and the neck very thin.
>
> There are also arrows called 'Sostrones' for night use. These are large and heavy, so that they cannot be shot far from the crossbow and are therefore easy to find when they are discharged at rabbits and hares by moonlight. They are also used with a dark lantern to kill pigeons on their roosts in the trees at night.
>
> Then there are other arrows for killing partridges which are a hand's breadth longer and have an iron knob at the head.
>
> Other shafts are called 'Pasadores', and are thicker than the ordinary arrows. Some shafts are known as 'Rallones', the points of which are like a chisel. There are also some termed 'Saetones', used for shooting at leverets or young rabbits; they are longer than the ordinary arrow and very sharp, and in the middle of the shaft is a small bar, so that when a rabbit is struck it cannot go down its burrow.[66]

Espinar gives a recipe for the preparation of the poison which was made from the roots of the white Hellebore. This acted best

on game of the 'most choleric temper' like the boar, the wolf, and the wild cat.

Just as there were different ideas about the design of the head of the bolt so there were different opinions as to what constituted the best form of feather. Materials such as parchment, wood, leather, bone, and brass were used; the shape and cut of the feather varied and also the angle at which it was set into the shaft to give a rotating action if required. The Löffelholz manuscript of 1505 gives a drawing of a machine, combining the function of a spokeshave and a lathe, for making the incisions in the shaft of crossbow bolts to hold the feathers.[67] The quivers used to carry the bolts were usually of cylindrical shape flared at the base which was flat so that it could be stood upright on the ground in use. They were made of hide or of wood covered with leather often left with its outer covering of fur (Fig. 74). A flap was nearly always provided. Decoration was sometimes applied by *cuir-bouilli* or by painting techniques, and, in a few cases, the metal mounts were decorated *en suite* with the bow they accompanied. By and large, however, the quiver was a utilitarian accessory which by its lack of decoration and vulnerable nature has rarely survived.

Development of the Sporting Crossbow

During the fourteenth and fifteenth centuries there was little alteration in the general appearance of the sporting crossbow. It resembled the military pattern with its long, straight stock swelling gracefully round the nut and tapering towards the butt (Pl. 70). A horn or steel bow was accompanied by a stirrup or, when a cranequin was used, a smaller hanging hook. The use of a cranequin rather than the belt hook or windlass was indicated by the steel pin thrust through the stock. A strip of horn was inlaid along the flat top of the stock and this was sometimes accompanied by a rudimentary decoration of horn inlay. In the Wallace Collection, London (No. A 1032), is a German steel crossbow of *c.* 1450–70 whose stock is entirely covered with horn plaques covered with mythological and hunting scenes. Such finely decorated crossbows of this period are exceptional. In the same collection is a plain crossbow (No. A 1034) of approximately the same size but with a horn bow. It is interesting to note

that the latter weighs only 4 lb. 12 oz. compared with the steel bow's 9 lb. 11 oz.

Although the stock in many cases was long enough to have been placed against the shoulder during shooting, it was still held against the cheek. As a sixteenth-century English poem by a Mr. Beele intoned:

> The tiller side lay surly to your cheke
> Let thouer egge rest somwhat on the bone
> Loke yor content be new for to seke
> Fetch ferre your breth stand fast as any stone.[68]

To allow the fingers of the right hand to hold the stock in this position comfortably and, at the same time to manipulate the trigger, the latter was made in the form of a long iron lever extending from the middle of the stock almost to the butt. The extensive length of this one-piece trigger and sear also assisted the pull-off of the sear from the notch cut in the nut. On the early crossbows the nut revolved freely in its cavity and there must have been many many occasions when excessive wear caused the sear either to jam in the nut or give a jerky release. Even when the nut revolved on a proper axle, as was later fitted, the trigger action left much to be desired.

During the second half of the sixteenth century with the fire-arm taking over the role of the crossbow as a military weapon, most attention was directed to the development of the crossbow as a sporting arm. There were two major lines of development. In the first the makers of central Europe and particularly those of Germany continued with the old basic design. But with the use of the windlass almost entirely discounted and the cranequin becoming increasingly popular, the crossbow makers were able to reduce the length of the stock and to broaden the butt, making sure, of course, that sufficient room had been left for the loop of the cranequin. Great ingenuity was exercised in this and in the case of at least one cranequin bow, the stock was twisted or 'cast off' so that a sportsman with only a left eye could shoot from his right side.[69]

The same crossbow makers were now copying the style of decoration used by the gunmakers, a lavish inlay of horn or ivory engraved with classical subjects and hunting scenes (Pl. 71). This intermingling of the two crafts also produced some extremely

interesting combinations of wheel-lock guns and crossbows. The curious thing is that some of the earliest dateable wheel-locks are found on these combination weapons. One of the earliest is the crossbow gun made for the Archduke Ferdinand of Austria, probably in Nuremberg between 1521 and 1526, now in the Bayerisches Nationalmuseum, Munich. Another group of these crossbow guns, perhaps of earlier date, are in the Palazzo Ducale, Venice (Nos. Q 1–3). The most complicated example is probably the combination gun and bow in the Kunsthistorisches Museum, Vienna, which has a self-spanning wheel-lock controlled by the bending lever of the crossbow. In the 1543 Inventory of the Armoury of the Gonzaga family at Mantua was the following intriguing item:

> A crossbow entirely of iron with four pistols in it and with its spanner and four bolts complete with their heads.
> (*Una balestra tuta de fero con schiopi quatro drento et con el suo manico da cargarla con quatro passadori ferrati*).[70]

This love of mechanical ingenuity is reflected in the attempts to improve the trigger and release systems. A great variety of lock actions with floating or secondary sear levers working with hair or set triggers were tried out. A crossbow dated 1599, in the Bern Historisches Museum (No. 1785), has a release action and set trigger mechanism involving a series of six swivelling levers.[71]

The other group of crossbows, which seem to have been favoured more by English, French, and Spanish makers, were of different construction. A long, straight, and slender stock, usually of rectangular section, had a steel bow of smaller span. The old-style nut and Z-shaped lever trigger were retained with little modification (Pl. 72). This type of bow was not so strong as the short stocky central European type and could be spanned with a goat's foot lever or bender. The decoration on the stocks of these bows is restrained, but the steel bows are often etched and gilt. A fine example is on the French bow in the Bargello, Florence (No. R 156).[72] The bows of Spanish examples often bear the signature and marks of the makers (*c.f.* Wallace Collection, No. A 1035; Madrid, No. J 18).

Although the gunmakers made great progress in the sixteenth century the crossbow remained an equally effective and popular sporting weapon, at least with the wealthier classes who could

afford their cost and were permitted by law to possess them. The royal households of Europe gave their patents and licences to crossbow makers and gunmakers on equal footing. In Henry VIII's reign Guillaume le Graunt and later John Russell were crossbow makers to the King; Giles Churchill was Groom and William Awbury Yeoman of the Crossbows; all drawing a daily fee and liberal expenses. A bill received by the Office of Crossbows in 1546 reveals some of the wear and tear of sporting events:

Of the crossbow maker, a new 'tyllar' for one of the French bows	13 . 4*d.*
A pin & other repairs of a gilt bow that Mr. Symbarbe gave the King	2 . 0*d.*

Included in the bill was the following interesting item:

A standard received by Grene [William Green] the coffer maker for the keeping and carrying of the King's crossbows with locks and keys, quivers, etc.	£4 . 10. 0[73]

The crossbow offered several advantages over the firearm. Apart from its less noisy and cleaner discharge, its bolt, if it missed the target, could be retrieved for further use. Young boys were often employed for this task but Olaus Magnus in his *Historia de Gentibus* of 1555 gives a charming woodcut of dogs acting as retrievers (Fig. 81). In 1540 Lady Lisle at Calais wrote to her friend Madame du Bours:

81. Dogs trained to recover crossbow bolts. From Magnus's *Historia de Gentibus* (1555).

I will send to England for poodles (*barbets*) for I can get none in this town, except one, which I send to your son. He is very good at retrieving the head or bolt of a crossbow both in water and on land and will fetch a tennis ball or a glove put on the end of a stick and other tricks.[74]

The lighter type of crossbow was ideally suited for the Tudor huntress. When, in 1591, Queen Elizabeth visited Cowdray in Sussex, a bower was built in the park and a silver-mounted crossbow was presented to her by a local damsel dressed as a nymph and singing an adulatory song in true Elizabethan fashion. 'Whereafter', ran the report, 'Her Majesty killed three or four buck and Lady Kildare one.'[75] When Duke Frederick of Würtemberg visited Queen Elizabeth in 1592, an English Lord was detailed to escort him to a deer hunt at Windsor. His secretary Rathgeb described what transpired: 'they chased a stag for a long time backwards and forwards with particularly good hounds, over an extensive and delightful plain; at length his Highness shot him in front with an English crossbow, and this deer the dogs finally worried and caught.' The Duke was obviously ill at ease with the English type of crossbow for the next day he again succeeded in only wounding a deer which had to be chased to exhaustion by the dogs.[76]

Another monarch who excelled in the sport of the crossbow was James I of whom the Venetian Ambassador was to write: 'He seems to have forgotten that he is a King except in his kingly pursuit of stags to which he is quite foolishly devoted.' As a young King of Scotland, aged 13 in 1580, it was noted that he delighted in a crossbow which he carried wherever he went.[77] In 1604 and 1614 James I sent presents to Phillip III of Spain which included, on the first occasion, 'Two Crosse-bowes with sheffes of arrowes' and on the second, 'Six crossbowes, thre plaine and thre with massive gould.' Two crossbows with their benders which can be identified as the gold inlaid ones of the last gift are now in the Royal Armoury, Madrid (Nos. J 109 and 111) (Pl. 73). Together with another bow in the Scott Collection, Glasgow Museum and Art Gallery, and one in the Mark Dineley Collection (Pl. 72), they form a fine representative group of the western European type of crossbow with its long straight stock and long lever trigger.[78]

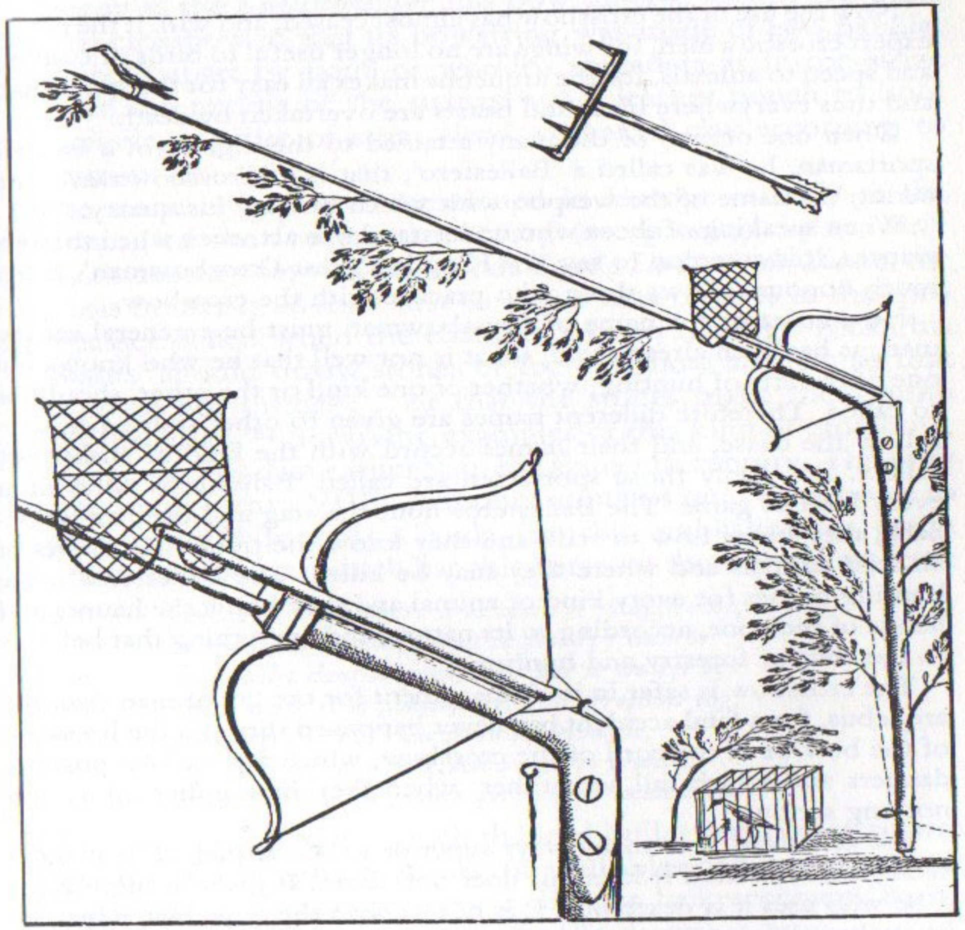
Whilst the English crossbow makers, of whom there were only

a few families like the Russells and the Billiards left, continued with this, by now traditional, form of crossbow, the German, Austrian, and Swiss makers were modelling their bows more and more on the pattern of the contemporary wheel-lock firearm which was also shot from the cheek. Many of these bows were fitted with a horn spring which looped over the nut and held the bolt in position on the stock. An extension of this idea was a new design of nut. This was in effect a metal clasp which swivelled down over the bowstring in the drawn position. By the middle of the seventeenth century many of these German crossbows had the down-drooping butt with wide cheekpiece and fingered trigger-guard of the wheel-lock rifle (Pl. 76). With these bows the cranequin could not be used.

Some of these light crossbow carbines which were spanned with the wooden pusher-type bender, have a wooden cover fitted over the bolt rest so that a barrel with a slot for the bow-string is created (Pl. 75). This type of bow could shoot bolts or bullets as desired. J. B. L. Carré illustrates one of them in his *Panoplie* (Paris, 1795), Pl. 9. For this *arbalète-à-jalet* he shows different types of quarrels with barbed or forked heads and a round-headed bolt which he names a *matras* or *garrot*. Bullets were ejected with the aid of a *chasse de fer*, something like a small iron ramrod on whose cupped end the bullet was seated. This type of crossbow is today often called a 'slurbow'. 'Slurbowes' are included in a 1599 Inventory of the Tower of London Armouries and there is a note that 'i lacks a bender', but an interesting feature is to be found in the description of the store of arrows. Here there were 'longebowe arrows', 'muskett arrows', 'one casefull for a di-culvering', 'crosbowe arrowes', and 'slurbowe arrowes whereof xvj wth fierworks'.[79] This suggestion of a naval or military connexion is confirmed by the fact that in 1588 twenty slurbows at a cost of 25*s.* each, with a dozen firework arrows per bow at 5*s.* per dozen were supplied to the ships under Sir Francis Drake.[80] The word slurbow in its original context then probably referred to a form of crossbow different from that meant today. Perhaps to a bow with a special release action like the Norwegian whaling bow. The word slur or slur-cock is a word used in the knitting trade describing the cam or lever which depresses or raises the jack sinkers.

By the middle of the seventeenth century the gunmakers had

developed the flint-lock gun to the point when game could be shot on the wing and at long distances with something approaching certainty. The sporting crossbow began to be relegated to the place of a novelty arm. But its comparatively silent operation still had its advantages and it was retained for a number of ingenious trapping mechanisms. In a tree trap suggested by G. M. Mitelli in his *Jagd-Lust* of 1739, bolts armed with nets or an array of spikes were discharged along the branches of dummy trees (Fig. 82). Some writers, however, continued to laud the



82. Crossbow bird traps disguised as trees. Birds alighting on the 'branches' were netted or impaled on multi-pointed bolts operated by remote control. Details from G. M. Mitelli's *Jagd-Lust* (1739).

crossbow's virtues as the supreme hunting weapon. In 1644 the Spanish gunmaker and crossbow maker (the trades were often combined) Alonso Martínez de Espinar put forward a plea for the bow and those who used it:

The crossbow was much used before the introduction of the arquebus. Those who followed the chase of the larger or smaller game killed with this weapon, and except for rapid firing or when a bird was on the wing it was highly esteemed, and the use of it produced very skilful crossbowmen.

Now the use of the crossbow has almost ceased, and with it the race of expert crossbowmen, for wings are no longer useful to birds or cunning and speed to animals, for the arquebus makes all easy for the sportsman, and thus everywhere birds and beasts are overtaken by death.

When one or two of the many attained to the dignity of a finished sportsman, he was called a 'Ballestero', that is a 'Crossbowmen', thus taking the name of the weapon with which he slew his quarry.

When speaking of those who understand this art, even when they are princes, it is common to say 'the King is a great Crossbowman', hence much honour follows those who practise with the crossbow.

He who earns the name of Crossbowman must be a general sportsman, as has been already said, for it is not well that he who knows but one of the arts of hunting, whether of one kind or the other, should be so called. Therefore different names are given to other sportsmen who follow the chase, and their names accord with the kind of chase they follow. . . . Only those sportsmen are called 'Ballesteros' who hunt every kind of game. The Ballesteros hunt the stag and deer on horseback, they know how to stalk and they know the tracks and habits of all wild animals and where they may be killed. The Ballesteros make hunting parties for every kind of animal and they know the haunts and habits of each one, according to its nature, and everything that belongs to the craft of forestry and hunting.

The crossbow is safer in its management for the life of man than the arquebus, for a fatal accident has never happened through the breaking of the bow or of the cord of the crossbow, which are the two possible dangers and which fail sometimes, when they may inflict injury but nothing serious.

The crossbow is in many ways superior to the arquebus. It is more silent, and in a herd it kills but does not alarm. It gives a dumb blow if he who uses it is dexterous. It is not so with the arquebus, which by its report alarms and scatters the herd. The crossbow is cleaner and less costly in its use. It is more effective than the arquebus and when once prepared for discharge never fails. Failure, on the contrary, too often happens with the arquebus. The crossbow also kills the greater as well as the lesser game.[81]

The Bullet or Stone Crossbow

But in spite of Espinar's opinion the crossbow was, by the end of the seventeenth century, generally superseded by the sporting rifle where large game was concerned. For smaller game and for certain kinds of bird it was to be retained in a special form as the bullet crossbow. Known in France as the *arbalète-à-jalet* and in Germany as the *Kugelschnepper* this bow differed mainly from the normal crossbow in that its bowstring was made of two parallel cords held apart by bone or wooden spreaders as in the stone bow. In the middle of the strings was a leather pouch to hold the missile, a pellet of stone, lead, or baked clay according to preference.

The stone crossbow is mentioned in Europe as early as the beginning of the fourteenth century (see p. 164). In an early fifteenth-century copy of Gaston de Foix's *La Livre de Chasse*, the chamois hunter is advised first to set up nets or hays in the runs and passes. Then when the chamois take to the high rocks his assistants 'should throw stones of the crossbow at them so that they come not thither . . . or that the stones make them jump down the rocks.'[82] Surviving examples of this kind of crossbow, however, do not date earlier than the sixteenth century. The 1547 Inventory of Henry VIII's Armoury contains one 'Crossbowe to shoote stone'.[83] In 1583 Claude Gauchet published his poem *Le Plaisir des Champs* which has this verse on the stone crossbow:

Lors avec l'arbalestre à la main je m'approche,
Je bande, et le boulet dans la fronde j'encoche
Et l'oeillet dans la noix; puis par le trou je voy
Et le merle et le poinet; alors, m'arrestant coy,
Je desserre la clef. La serre se desbande,
Et l'arc, qui se rejette avecque force grande,
Envoye en l'air le plomb qui, vers l'oiseau dressé.[84]

The '*force grande*' with which the lead bullet was projected was more that of a catapult than that of a full-blooded crossbow, but nevertheless the stone crossbows did not lack accuracy. Baron Hohberg in his *Georgica Curiosa* of 1682 describes how, in 1638, he watched Marshal Prince Mathias Medici at Bremen shoot with a stone bow at a ball thrown in the air by a page so that the two

balls, made of baked clay, were shattered. The stone crossbow of another Medici, Catherine, Queen of France (1533–59), is in the Musée de l'Armée, Paris (No. L 115). This is of a particular design which was popular in Italy and France. The painter Jan van der Straat (1523–1605), known as Stradanus, did most of his best work when he was employed in Florence by Duke Cosimo de Medici to make designs for tapestries in the Palace of Peggio-a-Cajano. Many of his drawings show men and women hunting birds, rabbits, and fowl with the Italian-type stone crossbow.

This had a distinctive stock with a straight butt dipping into a U-curve between bow and lock. Attached to the bow end of the stock was a twin-pronged upright foresight. The stock is often distinguished by fine wood carving with an animal or fish crouching on top behind the lock (Pl. 77). There was no nut, a simple pivoted lever ending in a hook being sufficient to hold the loop of the pouch. The two strings could be easily drawn back with the hands. The lack of power behind this bow is illustrated by the fact that in all Stradanus's drawings the hunters

83. Stalking birds with stone crossbows and the aid of a dummy cow (note men's feet underneath). From Stradanus's *Venationes* (1570).

with these bows are obliged to creep as near to their quarry as possible, sometimes employing hides (Fig. 83). A favourite scene which shows a cow draped with a blanket down to the ground is reproduced as part of the decoration on a German wheel-lock gun of *c.* 1580 in the Tower of London Armouries (No. XII–1547). Another Florentine painter, Antonio Tempesta (1555–1630), was fond of portraying the stone-bow hunters. G. P. Olina in his *Vccelliera*, published in Rome in 1622, includes an engraving of sportsmen armed with stone bows and a kind of net or long-handled swatter, hunting birds at night by the light of lanterns. Olina suggested that 'the crossbow used for this purpose should have a soft bow which should be covered (*d'arco dolce e incassata in modo*) so that neither the bow nor the fittings make the slightest noise when it is released. Thus if one shot misses, it is possible, as the bird has not been alarmed, to try again.'[85]

The German and Swiss types of stone crossbow were quite different. One type, the so-called slurbow, has already been mentioned (see p. 202). An example of this type of bow, apparently with a magazine action, had a silver plate on the stock inscribed with the rhyme:

> MIT 24 KUGEL BIN ICH SCHWANGER
> ICH GEBAERE EINE NACH DER ANDER
> SCHNELL IST DERSELBEN LAUF
> DER WARD VERLETZT DER SIE HELD AUF[86]
> (I am pregnant with 24 bullets
> I spew them forth one after the other
> In quick succession
> Whoever stops them gets hurt)

On the majority of German stone crossbows a steel bar acted as the stock to which was hinged a bending lever held by a clip to the butt. Pivoted on the lever was a box-lock containing a folding backsight, the hook and a system of levers connecting it to some form of trigger action. This bar or frame holding the lever and lock sometimes ends in a wooden-club butt meant for the cheek (Pl. 79) or, in later examples, is fitted into a gun-like stock typical of the region of manufacture (Pl. 81). The bows were made in many sizes from child-like toys to great target weapons. Some had a detachable platform or rest on the middle of the bow so that bolts could be fired if preferred. An interesting example of a

combination weapon is in the Victoria and Albert Museum (No. M 618–1927). This consists of a wheel-lock carbine whose barrel acts as the stock or frame of a stone crossbow.[87]

The stone crossbow was a popular sporting weapon in England. A sixteenth-century needlework panel at Hardwick Hall, Derbyshire, known as 'The Fowler', shows two crossbows in use against birds. One is the straight-stocked bolt crossbow, the other is an example of the Italian stone crossbow. It was the stone bow with the built-in bender or gaffle which attracted most attention in England. A crossbow made by the London gunmaker Andrew Dolep, *c.* 1695, in the Kienbusch Collection, has an Italian-type stock but the action is of the built-in bender kind. This kind of bow was brought to perfection by English crossbow makers of the late-eighteenth and early-nineteenth centuries. A silver-mounted stone bow by Joseph Egg, *c.* 1820, in the Tower of London Armouries (No. XI–97), has the built-in lever mechanism fitted to a normal type of gun butt so that it could be shot from the shoulder (Pl. 80). It has an aperture backsight and the prongs of the foresight are serrated and carry an adjustable beaded-wire sight.

W. B. Daniels in his *Rural Sports* of 1807 wrote of these bows:

> The *Bullet* Bows are of modern and much neater Construction, and their Accuracy, when once *set* is astonishing: the *splitting* a ball upon the Edge of a Knife, however extraordinary it may be found, is to be performed by a *Novice*, at a distance from *fifteen* to *twenty* yards; and the Ball will be thrown with the same *unerring* Certainty for fifty times successively.[88]

Two particular regions of England were noted for their stone crossbows in the nineteenth century, East Anglia and Lancashire. At least one book has been written about them by a devotee of the sport.[89] Although claims were made for extraordinary shots against rabbits and even larger game the stone bow's powers were best suited for birds. The old Italian sport of hunting with the night light seems to have been introduced into England. The 1845 edition of John Mayer's *Sportsman's Directory* advises:

> Let two or three go with lanterns and candles lighted, extended in one of their hands; and in the other hand a small net like a ratchet, but less, fixed at the end of a long pole, to beat down the birds as they sit at roost; which, surprised with the great blazing light, will not stir until they are knocked down. A crossbow for this kind of sport, is very useful to shoot them as they sit.

Sportsmen did not regard this potting of a sitting target too highly but this kind of shooting by day could have amusing results.

The following anecdote appeared in *Hone's Every Day Book* for 1848:

> Some time ago there were several large elm trees in the college garden, behind the Ecclesiastical Court, Doctor's Commons, in which a number of rooks had taken up their abode, forming in appearance a sort of convocation of aerial ecclesiastics. A young gentleman who lodged in an attic, and was their close neighbour, frequently amused himself with thinning this covey of black game by means of a crossbow. On the opposite side lived a curious old civilian, who observing from his study window, that the rooks often dropped senseless from their perch, or, as it may be said, without using a figure, 'hopped the twig', making no sign, nor any sign being made to his vision, to account for the phenomenon, sets his wits to work to consider the cause. It was probably during a profitless time of peace, and the doctor having plenty of time, weighed the matter over and over, till he was at length fully satisfied that he had made a great ornithological discovery, that its promulgation would give wings to his fame, and that he was fated by means of these rooks to say: 'Volito vivus per ora virum'. His goosequill and foolscap were quickly in requisition, and he actually wrote a treatise stating circumstantially what he himself had seen, and in conclusion, giving it as the settled conviction of his mind that rooks were subject to the falling sickness.[90]

In 1849 Richard Edward Hodges was granted his patent for 'Improvements in Mechanical Purchases' (see p. 171). A catapult gun made under this patent has every appearance of a gun except that its barrel is slit along each side and there are two projections at the muzzle to hold the elastic cord. Hodges described it as 'constructed after the manner of an ordinary fowling piece, which would be well adapted for deer shooting, as it will carry a long way and be attended with neither noise nor smell.' In the Tower of London Armouries is another type of Hodges catapult which has a gun stock and a rigid crossbow for the elastic cord (Pl. 84). Neither of these catapults made any serious challenge to the steel-sprung stone crossbow.

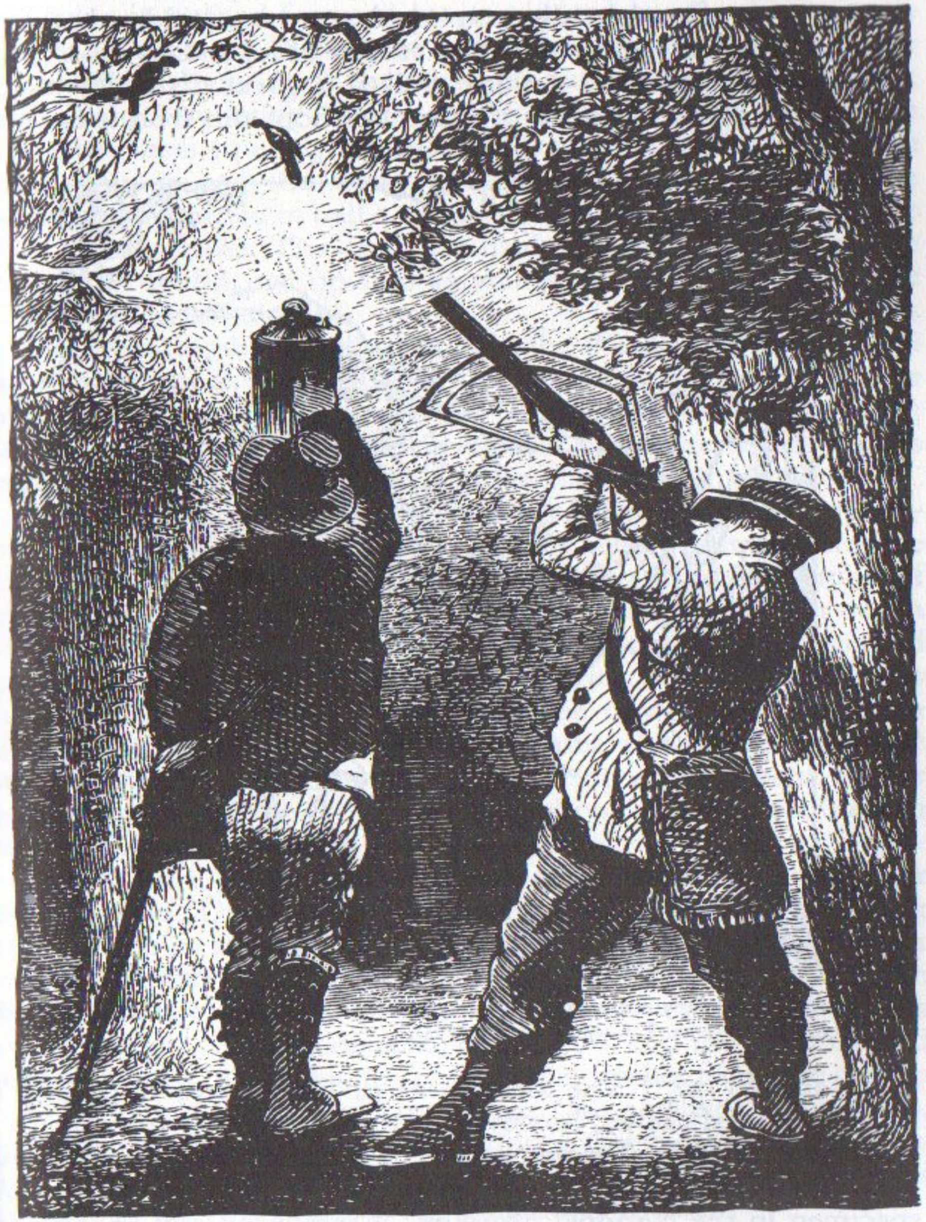
In Italy the use of the stone crossbow against the smaller birds so esteemed as a dish in that country continued comparatively unaffected by the shotgun which, if it had been used, might have damaged the delicate flesh. *La Chasse Illustrée* of 1868–9 gives an engraving of a night hunt in Italy, a scene little changed from that of the sixteenth century (Fig. 84).

Oriental Crossbows

The stone crossbow was also made in China. It had some features similar to the Italian type of bow with a dip in its wooden stock between the lock and the bow. The butt of the stock, however, instead of being straight like the European model was made with a convex curve, and the lock stood up on a bridge. The foresight was a more exotic version of the European sight, being a pearl set in the middle of a thread stretched across the vertical wire frame. The lock was very simple and consisted of two parts only, the hook and the trigger, both being made of bone. There were no springs, the two components being set by feel and remained locked together by the tension of the drawn string until the trigger was pulled. The bows which were usually made of bamboo backed with sinew were not very powerful.

The Chinese crossbow makers whose ancestors had probably seen the birth of the crossbow never made the progress of their European counterparts. The *T'ien-Kung K'ai-Wu*, a Chinese book on technology published in 1637, which describes hand crossbows made out of three-, five-, and seven-ply pieces of laminated bamboo, states that 'compared with the more than 200-pace travelling range of the arrow from a strong bow, the arrow from the strongest hand crossbow is powerful only within fifty paces and will fail to penetrate a piece of pongee at one foot beyond this limit.'[91] Illustrations of the eighteenth century show the bows being easily spanned by the hands using the foot or the knee to steady them (Fig. 85). For hunting the Chinese relied a lot on the use of poisoned arrows, the poison being prepared from the tubers of wild *aconitum* boiled in water.

Larger versions of the hand crossbow were the 'mighty-arm' crossbow (*shen-pi-nu*) and the 'vanquisher' crossbow (*k'o-ti nu*) which could discharge simultaneously two or three arrows. One of these larger bows is illustrated in a work by Miao-tze in the Museum für Völker Kunde, Berlin (No. I. D 10823), being used



84. Shooting roosting birds by lamplight with the stone crossbow. From the magazine *La Chasse Illustrée*, 29 August 1868.

against tigers.[92] Three men were needed to span and load this bow, and it was normally employed as a trap hidden beside a track. Chinese literature is full of stories of legendary crossbows which could penetrate a thick wall at a great distance; pierce three horses at a distance of three *li*; shoot ten iron arrows at

85. Chinese hunter spanning his crossbow (note the laminated bow) with his hands and knee. Detail from *T'u-shu-chi-ch'êng* (1726).

once, and so on.[93] The assessment of the Chinese crossbow's powers quoted above, however, is probably more realistic.

Another and revolutionary form of crossbow was the *chu-ko nu* which was a repeater with a magazine holding ten arrows. A specimen in the National Museum, Washington and another in the Nationalmuseum, Copenhagen have magazines with room for twenty arrows set in pairs. The bowstring passes through a

slot running along the bottom of the magazine. When the magazine is pushed forward by its pivoted handle the string is caught in the back of the slot and an arrow falls into place. As the handle is drawn back the magazine automatically brings back with it the bowstring. When it is fully withdrawn so that the magazine rests squarely on the stock, a vertical pin pushes the bowstring up and the arrow is released. The whole magazine could be discharged in half a minute but the range was little more than twenty paces. The Japanese made a copy of this bow, the *dokyu*, but it did not operate as smoothly or as rapidly as the Chinese model.[94]

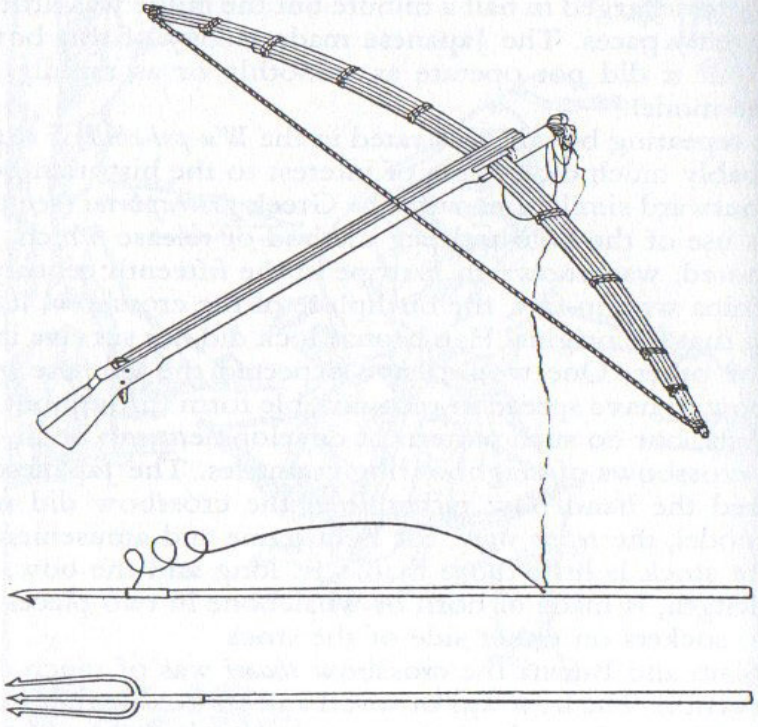
The repeating bow is illustrated in the *Wu-pei-chih* of 1621 and is probably much older. It is of interest to the historian because of its outward similarities with the Greek *gastraphetes* (see p. 173) and its use of the hole and peg method of release which, as has been noted, was known in Europe in the fifteenth century.

If China was, in fact, the birthplace of the crossbow, it is surprising that the original Han bronze lock did not survive in some form or other. One would have expected the Chinese type of crossbow to have spread in recognizable form throughout South East Asia, but no such pattern of development can be discerned in the crossbows of neighbouring countries. The Japanese, who favoured the hand bow rather than the crossbow did make a light model, the *teppo yumi*, for light game and amusement. The straight stock is little more than 2 ft. long and the bow, of the same length, is made of horn or whalebone in two pieces which fit into sockets on either side of the stock.

In Siam and Burma the crossbow *thami* was of much simpler construction. The bow was of wood and approximately 5 ft. long and was thrust through a hole cut in a straight but much shorter wooden stock. It had a powerful action and was spanned with the combined exertion of legs and arms. Nevertheless it was rarely used at a greater distance than 50 yd. and the hunter relied on a poisoned bolt to kill his prey. When freshly made the poison was extremely active and large game like elephant, rhinoceros, and tiger were brought down within a few hundred yards of a hit. In the Nicobar Islands and other islands of the South Seas crossbows known as *foin* were sometimes found.

In India the crossbow was known in the fifteenth century but it never achieved the same status as a sporting or military weapon

as it did elsewhere. Nevertheless it remained in use in various parts of the continent both as a hand weapon and as a trap for large animals like the tiger. In southern India, particularly on the Malabar Coast, it was put to the unusual purpose of shooting fish in streams and backwaters. The bow portions were made up of from two to four wooden slats about 4 ft. long fastened together



86. Crossbow for shooting fish from Malabar, Southern India. When the forked or hooked bolt is in position on the bow its line is coiled in a cylinder at the end of the stock.

like the leaf springs of a motor car (Fig. 86). This laminated bow and the straight wooden stock were very similar to the old Chinese crossbow but the lock was a simple arrangement of revolving nut and short lever trigger, based on the European pattern of the fifteenth and sixteenth centuries. The arrows shot from these crossbows were either like miniature harpoons, the detachable steel barb being connected by a string to a cylindrical

container at the end of the stock, or had heads shaped as barbed lances or tridents. This type of crossbow was occasionally employed against birds and then a blunt wooden bolt was used (Fig. 86).[95]

The crossbow in Africa seems to have been confined mainly to the west coast, where until recently it was in use by the Fan and Mpongwe tribes of the Gaboon and Ogowe rivers. The *nayin*, as it was called, was inspired by European models introduced by Portuguese, Dutch, and English explorers following the coastal waters in the fifteenth and sixteenth centuries. The sailors could well have been carrying wooden bows of the Norwegian whaling type (see p. 179). A Benin bronze plaque in the British Museum shows European figures carrying crossbows which appear to have the characteristic split stock of this type of bow. The Fan type of crossbow is similar to the Norwegian type in nearly every respect except that usually the stock is in one piece, the under-lever being formed by splitting the wood down the grain leaving it joined at the bow end. In other West African types the wood is split in the middle with the two ends left joined together. In these examples a transverse peg is inserted to keep the pieces apart. Amongst some of the Mandingo and Benin tribes, the Norwegian type of crossbow is copied exactly, a separate under-lever being hinged in front of the peg hole. An example of the Fan crossbow in the Pitt Rivers Museum, Oxford, has a span of just over 2 ft. and a length of approximately 4 ft. It was spanned by the archer sitting down and applying both feet to the bow. Small poisoned darts were the favourite missiles. These thin strips of wood, about 1 ft. long, were so light that the archer had to keep them in place on the arrow groove of the stock with a dab of gum. Larger iron headed arrows about 2 ft. long were used against big game.[96]

In recent years the crossbow, with a history of some two thousand years behind it, has once again attracted the attention of sportsmen. Various types of strong target bows are now being made and in the U.S.A. attempts are being made to popularize hunting with the crossbow. Even with the most up-to-date of bows, however, the effective range is rarely over 50 yd.

Chapter Six

Guns

Handguns and Match-locks

In 1326 cannon are mentioned in a decree of the Council of Florence and they are illustrated in the two manuscripts of the same date prepared by Walter de Milemete, chaplain to Edward III. In the second half of the fourteenth century references to what must have been guns small enough to have been carried and managed by one man appear in the records of England, France, and Germany, and, in 1388, the term 'handgun' (*'canones paruos vocatos handgunnes'*) is found in the accounts of the English Privy Wardrobe.[1] The first handguns, however, were little more than miniature cannons mounted on pole-like stocks. To be fired they had to be supported in one hand whilst the other manoeuvred a burning match or tinder into the touchhole. The gun could be pointed in the general direction of the target but no real aim could be taken. Towards the end of the fifteenth century, however, the gun barrel was being fitted to a rudimentary form of wooden stock and a crude match-lock held the slow match. The gun could now be held firmly with two hands, aimed at a target and the priming fired at the right moment by pressure of the forefinger on a trigger.

That great Master of the Hunt, the Emperor Maximilian I (1459–1519), although a great admirer of artillery and military guns did not approve of firearms being employed in hunting. He made a bitter complaint about the use of the 'devilish fire-guns' by peasants, against which he subsequently passed harsh regulations, and nothing pleased him more than when, at a range of 200 yd., he killed, with his crossbow, a chamois which one of his hunters had failed to hit with a gun.[2] But, ironically enough, one of the first illustrations of a firearm being used for hunting

shows Maximilian himself firing at a chamois. It appears in the Fishing Book (*Tiroler Fischereibuch*) which Jörg Kölderer of Innsbruck painted for him in 1504.[3] Maximilian's gun appears to be of the same kind as those which were issued tó his troops, a handgun with a simple form of match holder swivelling on the side of the barrel. They were drawn in more detail by Kölderer for Maximilian's *Zeugbuch* of 1507.[4]

Maximilian accumulated great stores of these plain handguns for his armies but he died before gunmakers had begun to fashion the firearm into a fine decorative piece of machinery worthy of a prince's personal armoury. His protegée and friend, Henry VIII, in the early years of his reign, was equally reticent over the use of firearms for hunting. In January 1531, however, he was given a 'hande gonne' as a New Year's gift and this was evidently put to good use for, a year later, his Armourer, Erasmus Kyrkenar, was paid 'for trymyng of his graces gonne'. No appointment of royal gunmaker was then considered necessary and in the same year it was the Yeoman of Crossbows, Giles Churchill, who cared for the King's stalking horse. The crossbow was still considered the more important hunting weapon.[5] It is not until 1536–7 that we read of targets being erected at Greenwich and Windsor 'for the Kyng to shotte at with his handgonne'. The following year he appointed the first Keeper of the King's Handguns and Demi-Hawks.[6] An inventory of his armouries taken after his death in 1547, however, reveals that in a comparatively short space of time, he had acquired a number of fine-quality firearms.[7] Their descriptions are interesting because they give details of the decoration then in vogue and show to what extent the gun had developed mechanically.

There were 'Italian Peces pcell guilte and varnysshed covered with vellet wt flaskes touche boxes and purses.' Many of the King's guns and sword scabbards were covered with velvet, a most impracticable material for this purpose one would have thought. But a sixteenth-century airgun in the Livrustkammar, Stockholm (No. 1196), and a match-lock fowling piece in the Kunsthistorisches Museum, Vienna (No. D 156), are surviving examples of this style of manufacture. The latter gun, which is Italian of *c.* 1530–40, has its lock and barrel damascened with gold, and the black velvet of the stock is decorated with silver studs. It could well be similar to one of Henry VIII's 'Italian

Peces'. Most of the King's guns were of more colourful attire. They had stocks 'of yellowe', 'covered with grene velvet', 'vernysshed Redde', 'garnysshed with bone', or 'with stone'. Some of the guns were 'chamber peces', i.e. loaded at the breech with metal cartridges.[8] Others, both muzzleloaders and breech-loaders, were fitted with 'fier lockes'.

Wheel-locks

'Fier lockes' were probably the lock mechanisms now known as wheel-locks, in which the priming powder is ignited by the spark thrown out by a serrated wheel revolving against a piece of iron pyrites. It was a mechanism illustrated by Leonardo da Vinci in his *Codex Atlanticus* as early as *c.* 1500–10. Although it may not necessarily refer to the same weapon, a poem composed by the Cardinal Adrian de Saint-Chrysogone, printed in Venice in 1505, describes in elegant Latin a 'wonderfully horrible engine which projects a ball of lead at game, striking it with the force of lightning.'[9]

The earliest dated example of a wheel-lock gun is the carbine in the Real Armeria, Madrid (No. L 32), which was made for Emperor Charles V in 1530 by Bartholme Marquart of Augsburg. In *c.* 1540 the contents of his armoury and wardrobe were listed in a series of watercolour drawings now known as the *Inventario Iluminado*. After his death in 1558 a proper inventory, the *Relacion*, was prepared. From this we find that he had long discarded the simple handgun, and all his guns, except one, were described as arquebuses (*arcabuces*)—some small (*arcabuzillos*) and some for the saddle (*de arzon*). As the exception is specifically described as a match-lock (*de mecha*), the others were undoubtedly wheel-locks. They were also, for the most part, decorated with gilt engraving and the stocks were inlaid or covered with bone plaques.[10] The *Inventario* shows that the guns like many of Henry VIII's, were kept in cases or bags of coloured velvet. Another wheel-lock carbine, dated 1533, bearing the arms and initials of Otto Heinrich, Count Palatine of the Rhine (d. 1559), is in the Bayerisches Nationalmuseum, Munich. In the same museum is a wooden table top (No. 14/130) painted with hunting scenes. One shows a boar hunt in which one hunter is firing at the boar with a gun. A much longer wheel-lock gun of *c.* 1535 with a 37-in. barrel is in the Tower of London Armouries (No. XII-1566). The stock of this hunting gun is appropriately covered with a veneer of rough staghorn. The second quarter of the sixteenth century then saw the beginnings of the firearm as a real hunting weapon. A book on sporting firearms, Pablo del Fucar's *Ballestas Mosquetes y Arcabuces*, was published in Naples in 1535.[11]

Whilst the royalty and nobility of Europe began to add sporting firearms to their armouries and to encourage gunmakers to produce guns of fine quality, they did everything possible to discourage their subjects from doing the same. There were several reasons for this. In the first place any gun outside the control of an official body or government arsenal was a possible threat to security; pistols, in particular, were the subject of much restrictive legislation for many years (see pp. 307–8). In England another reason was the desire to maintain the standard of shooting with the long-bow. From 1500 onwards various acts and proclamations were passed with this aim in view. The most important Firearms Act (33 Hen. VIII, c. vi), passed in 1541, complained that 'divers gentlemen, yeomen and serving men, now of late have laid apart the good and laudable exercise of the long bow, which always heretofore hath been the surety, safeguard and continual defence of this realm of England and an inestimable dread and terror to the enemies of the same'. England's enemies, however, persisted in their use of firearms. Whenever war threatened therefore the English populace were hastily adjured to practise with handguns and hagbushes. When the threat was removed back came the restrictions. In 1546, for instance, proclamations were issued 'for the restraynte of shootyng in handgunnes', pointing out that with peace prevailing the Act of 1541 was to be obeyed and that a gun could be used only with a licence and only if it conformed to certain measurements (usually a minimum of over 2½ feet).

The first licence holders of the 1520s and 1530s were notable for their enthusiasm rather than the accuracy of their shooting. Although, in 1533, there is a reference to a successful shot, a 'watter hen kylled with the gun',[12] a more typical story is that of John Geynyshe, a yeoman of Westminster, who, in 1539, was reported to have taken a pot-shot at a crow standing on a buoy in the river Thames. He missed the crow and killed a woman washing linen on Westminster Bridge. Such was the novelty of the crime that he was given a pardon.[13] The novelty soon wore

off, however, and in 1540 an English proclamation limited the use of handguns to firing against butts as sportsmen with licences were 'shooting without having regard or respect where their pellets do fall or light down after their shot' so that the King's officers and subjects 'have been put in great jeopardy of their lives'.

Another source of complaint was from sportsmen using other hunting methods who found that game in their neighbourhood was being driven away by the noise and smell of guns. This seems to have been a universal complaint. Dominique Boccamazza, who wrote a treatise on field sports of the country around Rome in 1548, regretted that the use of the arquebus had so alarmed and dispersed all animals of the deer kind that the sportsman of his day rarely returned home successful from their chase.[14] Falconers were the most incensed. Sir Edmund Bedingfield wrote to the Earl of Bath in the same year to complain of:

such persons as dayly do shoote in handegonnes, and beat at the fowles in ryvers and pyttes so as ther is no fowle that do remayne in the countrye; a man disposed to have a flight wt hawkes may seeke tenn myles ere he fynde one coople of fowls to fly at, wheare in all yeres past there shulde have been founde in the same places vc. coople of fowls. . . . If this be not reamyded, you wt all the rest of the nobilitie may put foorth your hawkes to breede and to keep no more.'[15]

It is noticeable that in the draft of a proposed Elizabethan gun licence a proviso has been inserted to the effect that the gun was not to be used 'w^th^in fyve myles of any of the Queenes Maties howses where her highness usethe comonly to lye' nor'at any Brooke waters ryvers or plasshes mete or convenyent for hawkinge'.[16]

Nevertheless, in the face of all the acts, statutes, and proclamations, even in defiance of the Scottish Act of May 1551 which ordained that no liege should 'shutte with the half-hag, culvering or pistolet at Deare, Roe, Wilde beastes or Wilde Fowles in any time to come under the pain of death and confiscation of all their gudes for their contemption', the shooting continued and the use of firearms for hunting spread quickly. Woodcuts based on drawings by such artists as Jost Amman and Stradanus show that game was stalked on the ground and shot from behind natural or

artificial cover wherever possible. The favourite target seems to have been water fowl on lakes and rivers where a good retriever was necessary (Fig. 87). A licence issued to Henry MacWilliam, a Gentleman Pensioner, in 1567 lists thirty-seven varieties of birds which might be shot. The animals included dogs, cats, otters, and foxes. Deer, it was made clear, could only be hunted with the permission of the owner.[17]

87. Hunters with wheel-lock guns after herons and ducks. Woodcut from *Venatus et Aucupium* (1582).

A wheel-lock gun with a short butt fired from the cheek, the heavy barrel absorbing most of the recoil from the comparatively weak powder, was the standard weapon of the wealthier classes of the sixteenth century. The common sportsman had normally to be content with a plain match-lock gun, uncertain in its fire and often betraying his presence by the glowing, smoking match. The barrels of most guns could fire one or more balls according to the wish of the shooter. Benvenuto Cellini writing in 1524 speaks of a 'straight fowling piece made by my own hands; and

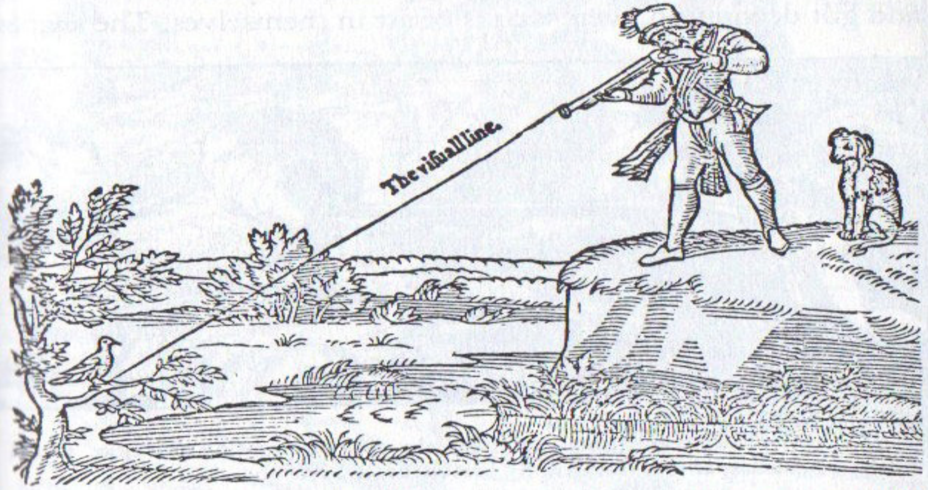
(so bright was it) both within and without there was never seen a mirror like it'. Unlike most of his contemporaries he loaded his gun carefully with one ball in order to shoot wild fowl and peacocks. He boasted that 'with powder amounting in weight to a fifth part of the ball, the said ball could carry two hundred paces point blank (*in punto bianco*)'.[18]

The majority of sportsmen did not expect to achieve the accuracy of shooting which Cellini claimed with one ball. In fact, they very soon found that by loading their barrels with a number of small shot which spread out into a rough circular area by the time it had reached the target they stood a better chance of a kill. The lead shot, known as hail shot, was probably made at first by being cut from a sheet of lead in small cubes and roughly polished or by being cast in bullet moulds containing a number of small cavities. But, by at least the last quarter of the seventeenth century shotmakers had discovered the method of pouring molten lead through a sieve and allowing the drops to fall into water.[19] In the 1547 Inventory of Henry VIII's armouries were forty-one 'Haile Shotte peics', probably of wall-gun size, and one 'harquebusier for haile shotte'.[20]

One would have liked to have seen how this one gun differed from all the other 'harquebusiers' which were in the Inventory. Public use of hail shot soon met with official disapproval. An Act of 1548 (2 & 3 Edw. VI, c. xiii) deplored the 'shoting of hayle-shot wherby an infinite sort of fowle is killed and much gaym thereby distroyed, to the benefitt of no man'. Having also pointed out that '. . . the use of hayle-shot utterlie distroyeth the certainty of shotynge which in warres is much requisite', the Act went on to forbid the shooting of 'any more pellets than one at a tyme'. Anyone who reads the laboured explanations of elementary ballistics in, for instance, Cyprian Lucar's *Three Bookes of Colloquies*, published in London in 1588, will appreciate how little was known of the art of shooting in the sixteenth century and, with the limitations on accuracy set by the poor standard of the guns themselves, it was too much to expect the ordinary sportsman to be able to hit even a stationary bird or rabbit with only one bullet at more than a few yards. The 1548 Act was therefore largely ignored—the common man was already beset with enough Game Laws as it was.

The Act also specifically forbade shooting 'upon anie church,

house or dove-cote', and it is amusing to note that this homely sport was still going on fifty years later. In 1598 a complaint was made that the French Church in Norwich had been invaded by 'a man havinge a peece, who there did shute to kill pigeons, not onelie to the profaninge of the place of praier, but to also to the endangeringe of the whole Pallace by fire and terryfyinge of some within the same'.[21] It was not only in the towns and villages, however, that the gun was making its presence felt. It is obvious that men who had quietly taken their pick of the great game



88. How to shoot at 'a loe mark within a convenient distance'. From Cyprian Lucar's *Three Bookes of Colloquies* (1588).

preserves with an arrow or crossbow bolt now found that they could get a good bag with one well-placed charge of shot from the clumsiest of match-lock fowling pieces. On 21 December 1600, just in time to spoil a few Christmas dinners, yet another Royal Proclamation was passed in England prohibiting the use of birding pieces because game was being destroyed 'which should serve to the delight of her Majesty, the nobility, and other men of quality'. The common birding pieces of this time were the match-lock guns about 5–6 ft. long which Stradanus depicts in his drawings (Fig. 89).

In the seventeenth century, for the benefit mainly of 'men of quality', the wheel-lock gun was developed to its full extent. National characteristics began to be noticeable in the design of

the stock and lock. French gunmakers brought out a special kind of wheel-lock in which the mainspring was separated from the lock and pinned to the stock. Italian wheel-locks had a distinctive elegant shape and were much lighter than their solid German counterparts. There were enclosed locks, often of fanciful shapes giving some immunity against inclement conditions (Pl. 89); locks which had smoke tubes to take away the after-effects of the priming powder burning; self-winding locks, so that the separate key or spanner, a usually vital accessory, could be dispensed with; and locks, which from the superb quality of their chiselled and gilt decoration, were works of art in themselves. The shapes

89. Wildfowler with match-lock gun. Note the curious shooting position. Detail from an engraving after a drawing by Stradanus, *c.* 1570–80.

of the gun stocks were just as varied and the decoration of the wood ranged from the ivory, bone, and mother-of-pearl inlays of Germany and Russia to the brass, steel, and silver inlays of Italy, Spain, and Sardinia.[22] Biblical, mythological and hunting scenes were favourite subjects for the decoration (Fig. 99). There was no lack of humour in some of these. The German artist Israhel van Mechenem (d. 1503), was one of several artists who did engravings based on the fable of the hares capturing their old enemies, man and the fox. These scenes, showing the hunters being roasted by the hares, are carved on the stock of the wheel-lock gun made for Leopold I (1640–1705), now in the George F. Harding Collection, Chicago. A certain amount of bawdy humour was not thought amiss. The Italian wheel-lock and match-lock gun in the Wallace Collection (No. A 1074), which is decorated with silver plaques engraved with erotic scenes, has

90. Wildfowler with wheel-lock gun crosses water with the aid of a belt of inflated skins. His feet are weighted with lead and fitted with paddles. From F. Kessler's *Sonderbahre und Bissher Verborgen-Gewesene Geheime Künste* (1722).

a backsight consisting of a reclining female nude. On the French 'forget-me-not' gun of *c.* 1590 in the Tower of London (No. XII–1764), the trigger juts out from an engraving of a male nude as an appropriate appendage.

Flint-Locks

Early in the seventeenth century a new form of lock began to challenge the superiority of the wheel-lock. This was the flint-lock in which the spark necessary to ignite the priming powder was obtained from a piece of flint striking a steel immediately over the priming pan. It is uncertain when the first flint-locks were made. Many of the early references in the sixteenth century to 'self-igniting guns', 'stone guns', 'dead-fire guns', etc. could apply to the flint-lock as well as to the wheel-lock, but whilst surviving examples of the wheel-locks date back to the 1530s the earliest specimens of flint-locks date to the 1550s. The first types of flint-locks had a steel separate from the pan cover which was usually opened by an interior lever brought into action when the cock moved forward after the trigger had been pulled. The main-spring bore directly on the tumbler of the cock but the sear mechanism was a horizontally-acting one similar to that of the wheel-lock. Altogether the first flint-locks offered little advantage over the wheel-locks apart from the fact that they did not need the same precision of manufacture and were cheaper to make.

The contemporary English name for the new guns was snaphance or snaphaunce,[23] but this word is nowadays applied only to flint-locks with a separate steel. The snaphances were for the most part large and rather clumsy examples of firearms. The portrait of Sir Thomas Southwell, *c.* 1630, in hunting attire accompanied by his retriever, shows him holding a snaphance gun of the proportions and finish of a musket (Fig. 91). An exception to the generally poor quality of these early flint-locks is the English petronel (a light gun with down-drooping butt fired from the chest) in the Tøjhusmuseum, Copenhagen (No. 10428). This gun, dated 1584, has a stock inlaid with mother-of-pearl and staghorn and a lock and barrel damascened with gold and silver.

Gunmakers very soon found that the whole mechanism of the flint-lock could be simplified by combining the steel and the pan cover in one right-angled piece of metal, the action of the flint

91. Painting of Sir Thomas Southwell (*c.* 1630) in hunting attire, holding a snaphance fowling piece. *Hon. John Southwell Russell Collection.*

striking the steel also serving to open the pan. As gunmakers began to develop this idea, different areas of Europe produced locks with features characteristic of that area and nowhere else. In the north, amongst the Scandinavian countries, the result was a distinctive style of flint-lock with an exterior mainspring acting on both the cock and the steel, often now called the Baltic lock. The neighbouring gunmakers of Russia continued to make the English and Dutch type of snaphance in archaic fashion for some years after it had died out in its countries of origin, fitting it to the gun known as the *samopál*. This had the wheel-lock type of butt lengthened so that it could be fired from the shoulder. To the south, in Italy and Spain and other countries bordering the Mediterranean, a flint-lock now known as the *miquelet*[24] lock took shape from an early date. It was a short stubby lock with an exterior mechanism which made the cutting of a large lock cavity in the wood of the stock unnecessary; this was an important point in countries where good quality walnut for stocks was not readily available.

For the hunter the flint-lock, even in its crude early stage of development, was a blessing. As Gervase Markham put it in his *Hungers Prevention* of 1621, when he was advising on the choice of a fowling piece: 'tis better it be a fire-locke or snaphannce than a cocke or tricker, for it is safe and better for carriage, readier for use, and keepes the powder dryer in all weather, whereas the blowing of a coale [the slow match] is many times the losse of the thing aymed at'. Unfortunately the flint-lock was still a large and uncertain piece of machinery. The English gunmakers, when they first adopted the combined steel and pan cover, simply fitted it to the old snaphance lock plate. They experimented with various types of sears but so indifferent were their performances that they often resorted to fitting a catch behind the lock to hold it securely when the gun was being carried loaded and primed.

The French gunmakers can be given the credit for introducing the outstanding improvement in the design of the flint-lock. This consisted of arranging the sear lever so that it fitted into notches cut in an interior tumbler which revolved with the cock. It was a further simplification of the flint-lock mechanism and the small, neat French locks of the first half of the seventeenth century make a striking contrast to the larger, clumsier appearances of

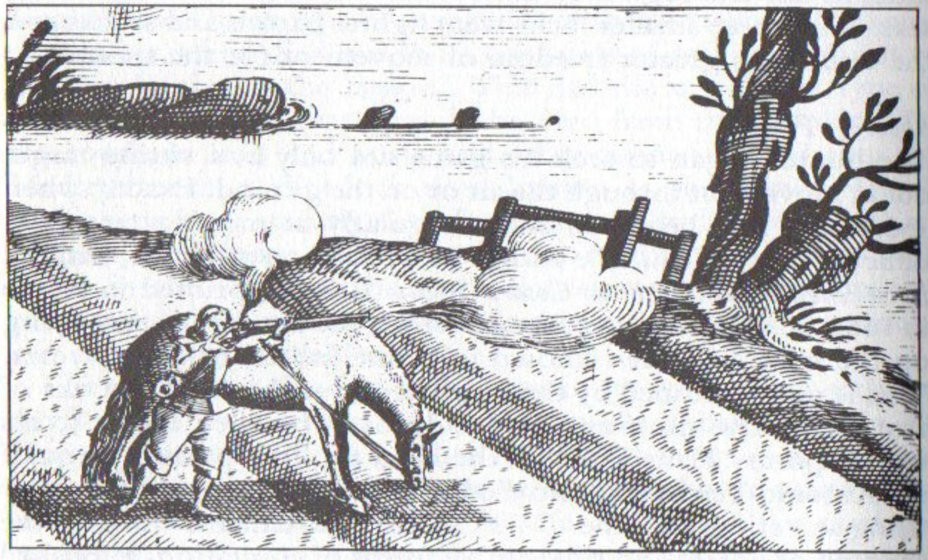
some other makes. A great encouragement to French gunmakers was Louis XIII's interest in weapons. In 1611, when he was only nine years old, he was the proud owner of seven guns. By 1614 this number had increased to fifty and by the time of his death in 1643 his collection was numbered in hundreds.[25] Other gunmakers in Germany, Italy, and Sweden sought to copy the French locks in size although they did not all adopt the vertically-acting sear. With these smaller locks went lighter barrels and stocks and the result was greater freedom of movement for the shooter.

Shooting Flying

The hunter began to seek his game not only as a sitting target but in movement through the air or on the ground. Exactly when sportsmen first began to shoot regularly at moving targets is difficult to establish. The author of a little-known work, entitled *Excellenza della Caccia de Cesare Solatio Romano*, printed in Rome in 1669, states that at the time he wrote, the art of shooting flying on the wing had been known in Rome for about eighty years. This is not confirmed by the illustrations or the text of books of that time. The drawings of Stradanus, who died in 1605, his contemporary Hans Bol, and the most prolific sporting artist of all, Antonio Tempesta, who died in 1630, always show the hunter firing at stationary game. *Della Cavallerie*, a standard work on the training of horses and riders in all forms of equitation, published in 1624, includes a section on teaching a horse to act as a hide for its master to shoot over when stalking game ('*Wie die Schiess-Pferde ab zu richten*') (Fig. 92).[26] In the poem *Le Plaisir des Champs* by Claude Gauchet, first published in 1583, several kinds of shooting with the arquebus are described. Partridges are shot on the snow, wild duck on the water; a roe is killed standing, and a litter of wild boars, sheltering with the sow, are fired on. When the poet sees a fox making off with a young leveret towards his lair, he heads him off but waits for the moment when the fox stops to shoulder his prey better before shooting. But he does cite one instance when he shoots at a running boar and pierces him 'through and through with two impetuous pieces of lead'.

The first illustration of gunners shooting flying appears to be Giacomo Franco's engraving of Venetian sportsmen shooting from boats on a lagoon. This appears in his *Habiti d'huome* of

1609 (Fig. 70).[27] The subject was not given any serious treatment until V. Bonfadini published his treatise on the sporting firearm, *La Caccio dell'arcabugio*, at Bologna in *c.* 1640. It was also dealt with in the Spanish gunmaker Martínez de Espinar's *Arte de Ballestería y Montería* of 1644. In a non-technical work, published in 1644, occurs the following interesting passage which describes



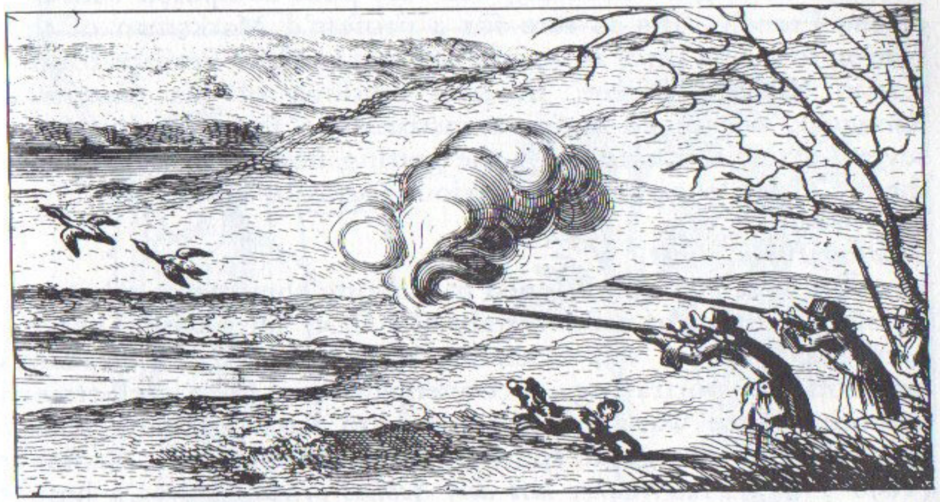
92. Hunter with wheel-lock gun (note smoke from the priming pan) training his horse to act as a hide when shooting water fowl. Detail from *Della Cavallerie* (1624).

how an American settler called Hilton of Pascataway, New England, shot a large bird of prey known as the 'Pilhannaw':

> Being by the Sea side, he perceived a great shadow over his head, the Sun shining out clear. Casting up his eyes he saw a monstrous Bird soaring aloft in the air; and of a sudden, all the *Ducks* and *Geese* (there being then a great many) dived under water, nothing of them appearing but their heads. Mr. *Hilton* having made readie his piece, shot and brought her down to the ground. How he disposed of her I know not, but had he taken her alive & sent her over to *England*, neither *Bartholomew* nor Sturbridge-Fair could have produced such another sight.[28]

English writers were generally slow in drawing attention to the new sport. In the same year Nicholas Cox published *The Gentleman's Recreation*, but made no mention of shooting birds

on the wing. The first book to deal with it appears to be Richard Blome's version of the same title, the first edition appearing in 1686. This includes two handsome engravings entitled 'Stalking' and 'Shooting Flying', which illustrate flying birds being shot from horseback and on foot (Fig. 93).[29] The new method of shooting was recommended by Blome 'as being by Experience found the best and surest Way; for when your Game is on the



93. Shooting flying with flint-lock guns. Detail from the engraving entitled 'Stalking' in R. Blome's *The Gentlemans Recreation* (1686).

Wing, it is more exposed to Danger; for if but one shot hits any Part of its Wings so expanded it will occasion its Fall, altho' not to kill it; so that your Spaniel will soon be its Victor, and, if well disciplin'd to the Sport, will bring it to you'. Blome advised the use of a gun 'about four Foot and a half long in the Barrel, and of a pretty wide Bore something under a Musket'.

Shooting flying was all very well provided you hit the target and at this date opinions obviously differed as to how you took your aim. Blome gave this judgement:

> Some are of Opinion, that you must *Shoot* something before the *Fowl*, otherwise it will be past before the *Shot* can come to it: but that is a vulgar Error, for no Game can fly so quick, but that the *Shot* will meet it; for the *Shot* flyeth as wide as about the Compass of a *Bushel*, if rightly order'd in the Charging: Yet I am of the Opinion, if the *Game* flyeth

as it were over your Head, that 'tis best to aim at the *Head*; and if it flyeth from you, to aim as it were under its Belly. And 'tis found best to let the Game fly a little past you before you let fly; for thereby the *Shot* will the better enter the Body.[30]

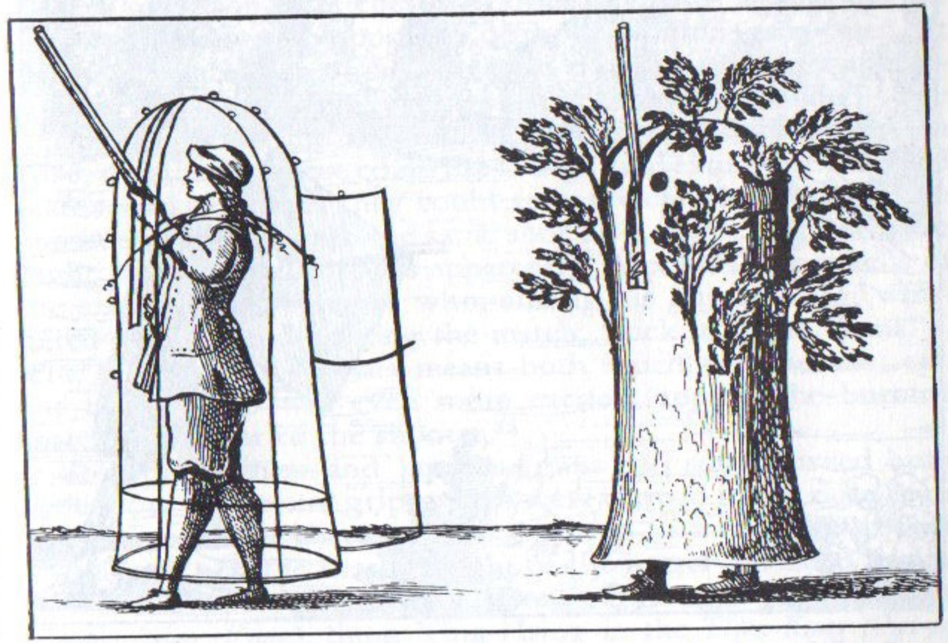
In 1727 George Markland devoted a book, *Pteryplegia; or, the Art of Shooting Flying*, to the subject. In this he gave detailed instructions for aiming off on various lines of flight. In his opinion the standard of English shooting was very poor compared with that of the French: 'It's as rare for a profess'd Marksman of that Nation to miss a Bird, as for one of Ours to Kill.' Perhaps for this reason Richard Blome, in later editions of his *Gentlemans Recreation*, continued to give instructions for shooting 'with several artificial Engines for the getting near to Fowl to shoot them'. These 'engines' were various forms of hides.

Shooting From Hides

Hunters were still conditioned to stalking their game whenever possible in order to make certain of a shot. They would use any natural cover that was available, bush, tree, or, as Stradanus was fond of portraying, a convenient cow. The well-trained 'shooting horse' was a valued companion. An eighteenth-century engraving by the great sporting artist Johann Elias Ridinger (1698–1767), *Federschutze mit dem Schiess-pferde*, shows a hunter with a wheel-lock gun firing at wild fowl from the shelter of his tethered horse in similar fashion to the hunter in the *Della Cavallerie* of 1624. In this respect Sir John Chardin's observations on his travels through Persia during the 1670s are interesting: 'Hunting the wild Goat is curious sport; those Beasts being light Footed, and hard to come at; they shoot them with a Musket in this Manner; they get the Camel to follow that Creature slowly, and come up to it; the Huntsman hides himself behind the Camel, and when he is within reach of the Goat shoots it, the Camel runs after it; and when it falls he stays by it, if he comes back, 'tis a Sign the Marks-man has mist his Aim.'[31]

What Blome proposed in his book were artificial hides copying some natural feature such as a tree or hedge. An elaborate version of the former was designed and published by Guiseppe Maria Mitelli in *Jagd-Lust* (Nuremberg, 1739) (Fig. 94). Blome, however, noted that birds were suspicious of 'these dead Engines, which carry not the Shape of a living Creature . . . for their seeing a

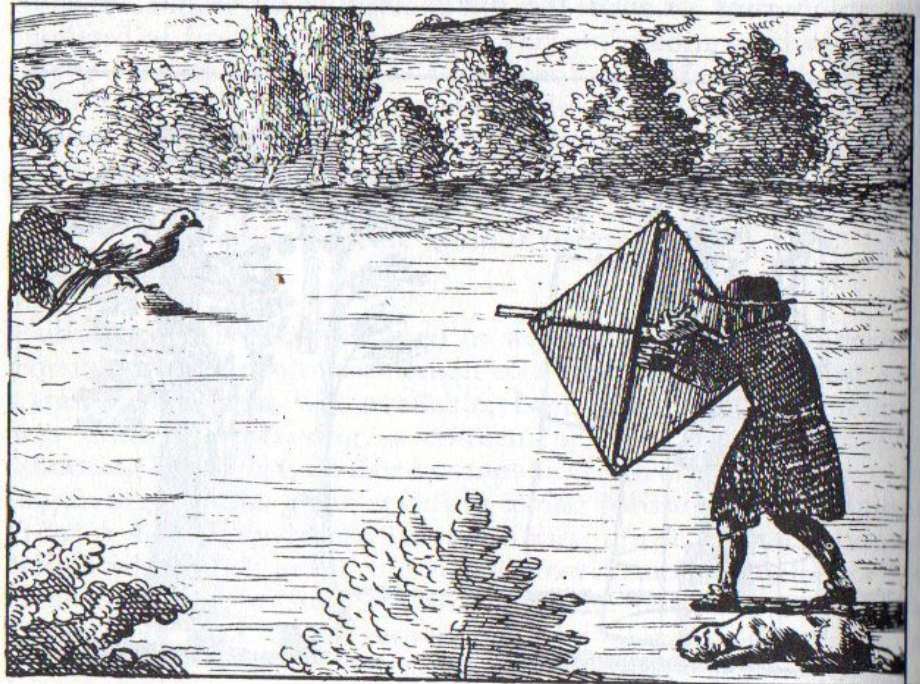
dead Thing move will cause Apprehension of Fear and Danger in them'. His favourite hide was the 'Artificial Stalking Horse'. This was made of painted canvas stuffed with straw and fixed to a spike which could be stuck in the ground as the hunter advanced towards the game. For good measure Blome threw in some instructions for constructing a gun trap, which could be set up in runs or near the earths of foxes, badgers, wolves, etc.



94. Design for a stalking cover in the form of a tree. From G. M. Mitelli's *Jagd-Lust* (1739).

Again for those who could not shoot flying there was the sport of 'perching the pheasant'. Of this Blome wrote: 'You must be provided with a good *Spaniel* that will Range well about, and when he hath *Pearched* the *Pheasant*, to *Bay* soundly, which will cause them to keep the *Pearch* the better; then hearing whereabouts he is, make up to him as privately as possible, and having espied him (being at a reasonable distance) make your Shot; and for your Dog's encouragement, let him bring it to you and make much of him'.[32] Pheasants were also shot with the aid of a hide which Blome called a 'Cocking-Cloth in Crowing time'. This

canvas hide was constructed like a modern boy's kite about a yard square, except that it had a hole cut in it through which the muzzle of a short gun could be thrust. The hunter simply held this square of canvas in front of him and, according to Blome, at 'crowing time' the pheasants 'will let you come near them, and the *Cocks* will be so bold as to fly at it'[33] (Fig. 95).



95. Detail from the engraving entitled 'Pearching the Pheasant' in R. Blome's *The Gentlemans Recreation* (1686), showing use of the 'Cocking-Cloth'.

Oriental Guns

By the second quarter of the eighteenth century in Europe the match-lock gun had practically disappeared and the wheel-lock was retained mainly for the ignition of the heavy rifles used in Germany and Austria. Except for the Mediterranean area the flint-lock in almost universal use was the French type of plain, uncomplicated construction. None of these changes, however, had much effect on the firearms of the East. The match-lock guns of India, Ceylon, China, and Japan, probably originally copied from those carried by the Portuguese explorers of the late

fifteenth and early sixteenth centuries, continued to be made practically unaltered. But in each country a distinctive type of gun had developed. The main difference lay in the form of the stock.

The Indian match-lock had a long, narrow, straight butt; the Sinhalese butt was a large affair bifurcated into two scroll-shaped parts. The Indian gun could be fired from the shoulder in European fashion, but the butt of the Sinhalese gun, from the evidence of early frescoes and sculptures, appears to have been placed more on the chest. Another curious aspect of the Sinhalese gun was the position of the lock which was often set on the left-hand side of the barrel. In spite of its clumsy appearance it was surprisingly accurate if dextrously handled. The Portuguese priest and scholar, Fernaõ de Queyroz, reported, in 1688, that the Sinhalese could fire at night and extinguish a lighted match; at sixty paces they could split a knife blade or put five consecutive bullets into the same spot on a target.[34] Shooting at night had its disadvantages apparently. A popular story tells of the excitable night hunter who, aiming his gun at a pig, whispered to his friend holding the match, 'stick it in the "kana" '. The last word in Sinhala means both touchhole and ear; and the friend, who was even more excited, applied the burning match to the ear of the shooter.[35]

Both the Chinese and Japanese guns had small curved butts little more than pistol grips which were clasped in the right hand and pressed to the cheek or chest in firing. As with the European wheel-lock gun the heavy weight of the barrel absorbed the recoil. The smaller Chinese guns, about 3 ft. long, were called bird pistols (*niao ch'ung*). Sung Ying-Hsing in the *T'ien-Kung K'ai-wu* of 1637 described one as follows:

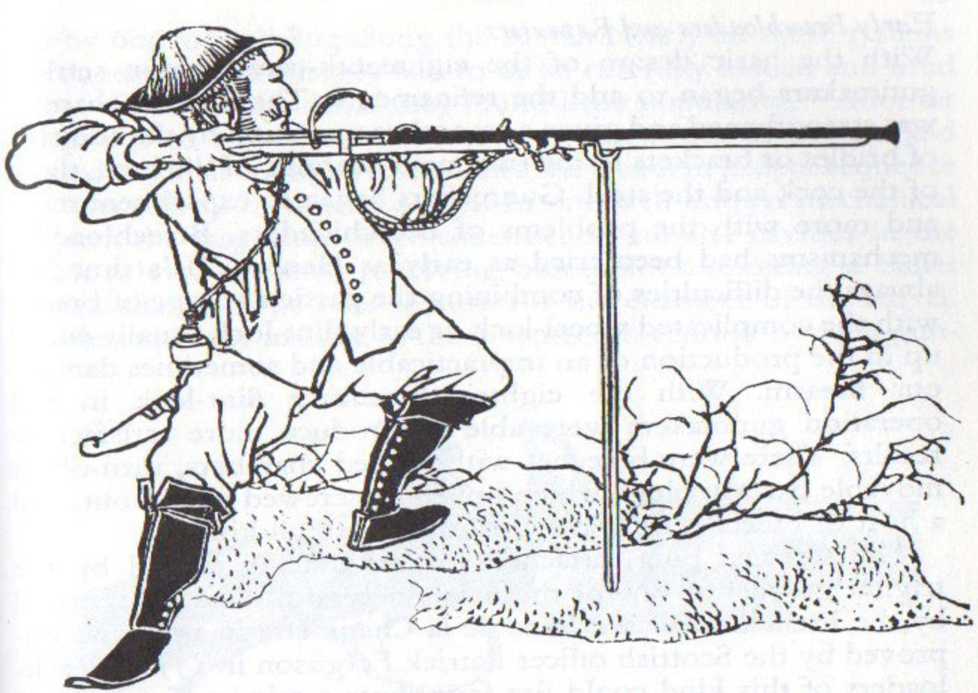
An iron barrel containing gunpowder is inserted into a wooden stock, which can be conveniently held by hand. The barrel is made by hammering separately three pieces of red-hot iron, each wrapped around a chop-stick size cold iron bar. The three resulting iron tubes are combined into a crude barrel through the heating and pressing together of their adjoining ends. The muzzle of the barrel is polished with a four-edged steel reamer, of the size of an ox gristle, so as to obtain an extremely smooth finish. This is necessary for the free discharging of pellets. The stock end of the barrel, containing gunpowder and pellets, is larger in diameter than the discharging end. Each pistol is loaded with 0·12 ounce of gunpowder and 0·2 ounce of lead and iron pellets. A

lighted hemp wick instead of a fuse is used to fire the pistol, (even though a fuse is still employed in south China). To fire at an enemy, the shooter holds the pistol in his left hand, and uses his right hand to pull [the trigger of] the gun-lock, which brings the lighted hemp to the top end of the priming pan filled with gunpowder. The pellets thus projected will shatter birds into pieces within a distance of 30 paces, kill them without tearing their bodies at more than 50 paces, and are extremely weak at 100 paces. In comparison, the pellets discharged from a bird gun, called *niao ch'iang*, can travel more than 200 paces. The bird rifle or gun is longer and contains more gunpowder than the bird pistol even though they are similar in shape and construction.[36]

Japanese match-lock guns were always of far better quality than the Chinese ones and their barrels were often made with the same fanatical skill and ceremony as the blades of Japanese swords. They varied considerably in size, some being short and heavy while others were long and slender (Fig. 96).

The barrels of European guns which at the beginning of the eighteenth century had rarely been less than 48 in. were steadily reduced to 42 in. and 40 in. as gunmakers began to find that the reduction made no difference to performance but increased the gun's manoeuvrability. Some gunmakers cut down their barrels to the minimum. On 7 November 1729 the London gunmaker, John Harman, inserted the following advertisement in *The Daily Journal*:

Whereas mention was made in several News Papers of Shot Guns 2 Foot 6 Inches in Barrel, made by me JOHN HARMAN, Gunsmith to his Royal Highness the Prince of Wales, that had on Trial out-shot Guns a Foot longer, which I aver to be true: These are therefore to inform the Publick, That I have made Experiments before Persons of Quality and Gentlemen, and that my short Guns have out-shot other Guns by them produced, from 6 to 12 Inches longer; and such Trial was from 40 to 60 Yards; and all such long Guns were esteemed as good as any in common: Some hundreds of these short Guns have been made by me for Noblemen and Gentlemen, all of which have given general Satisfaction. But as it is impossible for Guns 2 Foot 6 Inches in Barrel to be as good as those half a Foot longer, if such longer be managed with the same Art and Method; so I must acknowledge, that all my long Guns do excel my short ones: And to prove that the Performance entirely depends upon the Judgment and Skill of the Artist, I have corrected several Guns made by others, which have afterwards been equal to my own . . .



96. The Japanese artist Hokusai's idea of a Chinese hunter. The gun and powder flask are of Japanese design but the shooter uses a rest and holds his match in European fashion. From a woodcut in the *Mangwa*, *c.* 1834.

The methods of making the barrels were altered. At first flat strips of metal were bent round a suitable mandril and hammer welded along the length to form a tube. Spanish and Portuguese barrelmakers continued to use this method except that they made one barrel from five or six smaller tubes skilfully hammered and joined together. In most other European countries gunmakers began to adopt the so-called Damascus or twist barrels. For these the flat strip of metal, itself made by twisting and welding a number of iron and steel bars together, was coiled round the mandril to form a barrel, the process producing a variety of spiral patterns on the surface of the metal and a much lighter, stronger construction. The butts of the guns which at first retained the bulbous heels of the seventeenth century were filed down and a graceful tubular wrist was produced to contribute to the ease of handling. On the majority of guns the stock was still made full-length reaching to the muzzle.

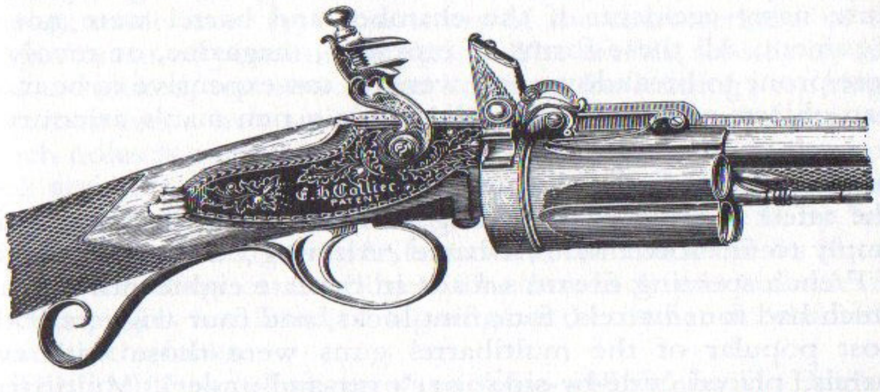
Early Breechloaders and Repeaters

With the basic design of the eighteenth-century gun settled, gunmakers began to add the refinements. The lock mechanism was strengthened and given a smoother operation by the addition of bridles or brackets to the two main bearings of the lock, those of the cock and the steel. Gunmakers began to experiment more and more with the problems of breechloaders. Breechloading mechanisms had been tried as early as Henry VIII's time but always the difficulties of combining the particular type of breech with the complicated wheel-lock or early flint-lock usually ended up in the production of an impracticable and sometimes dangerous firearm. With the eighteenth-century flint-lock in full operation gunmakers were able to produce more satisfactory results. There were breeches with hinged chambers, turn-off or movable barrels, plugs which pulled or screwed in and out, and a host of breeches with metal cartridges of all kinds.

The screwed plug, attached to and quickly turned by the trigger guard was one of the most successful ideas. Originated by the French mechanic Isaac de la Chaumette in 1704 and improved by the Scottish officer Patrick Ferguson in 1776, breechloaders of this kind could fire four shots a minute if necessary. Such a requirement was not normally called for by sportsmen. The gun with a set of reloadable metal cartridges was more preferred. These breechloaders were made with barrels which twisted sideways or which broke at the breech exactly like the modern shotgun. One of the finest examples of this type is the gun by Joseph Cano of Madrid, made in 1736, and now in the Real Armeria, Madrid (No. K 156). It bears the arms of Philip V in gold set with diamonds and has a set of reloadable metal cartridges which were carried in a satchel.[37] Each cartridge had its own priming pan and steel, a provision which saved the time of priming at each shot, but added to the weight and increased the risk of damp priming.

The majority of sportsmen stuck to their muzzleloaders, ensuring that the charge and priming were freshly loaded for each shot. Nevertheless, because of the likelihood of a miss or a misfire, the advantages of a spare shot were generally recognized. There were many attempts to find a way of providing this quickly and safely. Some barrels were made to take more than one charge, each charge being ignited in turn by a series of locks

or by one lock sliding along the barrel. Nearly all these systems of superimposed charges had to be so carefully loaded and fired to avoid an accident that they found little popularity.[38] Another way was to incorporate in the gun magazines of bullets and powder which could be loaded into the barrel in proper sequence by some form of breech action. In one well-known mechanical system the magazines were contained in tubular cavities in the butt, a lever-operated revolving breechblock selecting a bullet and a charge of powder in turn for the chamber of the barrel. Made originally in Italy in the seventeenth century by such gun-



97. Elisha Collier's revolving gun with magazine primer patented in England in 1818. On some models the mechanism was revolved automatically by clockwork springs.

makers as Michele Lorenzoni, Giacomo Berselli, and Bartolomeo Cotel, these early repeaters were widely copied throughout the seventeenth and eighteenth century by English gunmakers of whom the first and foremost was John Cookson in *c.* 1690.

A more ingenious system in which there was less likelihood of the barrel explosion striking back and igniting the powder magazine was the Kalthoff system. Made in Denmark, Holland, England, and Russia by members of a family of seventeenth-century gunmakers of that name, the revolving breechblock was worked by the trigger-guard, which also acted as a carrier to transport the powder from the butt to the front of the lock for priming and charging. In another system, again initiated apparently in Italy, the powder and bullets were housed in separate tubular containers under the barrel which was rotated on its axis

to operate the mechanism. This type of magazine action was resurrected late in the eighteenth century by the French gunmaker Chalembrom working in India.[39]

The various systems of revolvers, fitted either with revolving clusters of barrels or with revolving cylinders containing a number of chambers ready loaded which were brought into line with the barrel one-by-one, also had their adherents. The earliest of these revolvers date back to the sixteenth century and many ingenious means were found to make them work with match-locks, wheel-locks, or flint-locks. But the first group were too heavy to be of much practical value and the second group could cause nasty accidents if the chamber and barrel were not in alignment. All these forms of repeaters, magazine, or revolver, were prone to breakdown and were far too expensive to be more than objects of curiosity and display in a rich man's armoury.[40]

Double-barrelled Guns

The safest method of providing more than one shot was quite simply to fit more than one barrel. Although there was a series of French sporting firearms made in the late eighteenth century which had four barrels, four flint-locks, and four triggers,[41] the most popular of the multibarrel guns were those with two barrels, placed 'side-by-side' or 'over-and-under'. Multibarrel guns were known as early as the fifteenth century. In the 1547 Inventory of Henry VIII's arms at Greenwich was 'one Dagge with two peces in one stocke'.[42] This was probably similar to the short carbine or saddle pistol of Charles V of Spain, illustrated in the *Inventario Iluminado* (see p. 218) of *c.* 1540–50. Some heavy wheel-lock rifles with double barrels were also made in the sixteenth century, but it was not until the second half of the seventeenth century that the forerunners of the double-barrelled shotgun as we know it today were made. A light side-by-side double-barrelled flint-lock gun signed GIOSEPE FRACINO formerly in the Spitzer Collection[43] and exhibited in the 1900 International Exhibition at Paris is a good example of the fully-stocked gun of this period. A flint-lock gun of *c.* 1650 signed ABRAHAM MUNIER A GENEVE, in the Tøjhusmuseum, Copenhagen (No. B 680), has over-and-under barrels.

A surprising number of these had turn-over or revolving barrels, a single lock sufficing to fire each barrel in turn. One of

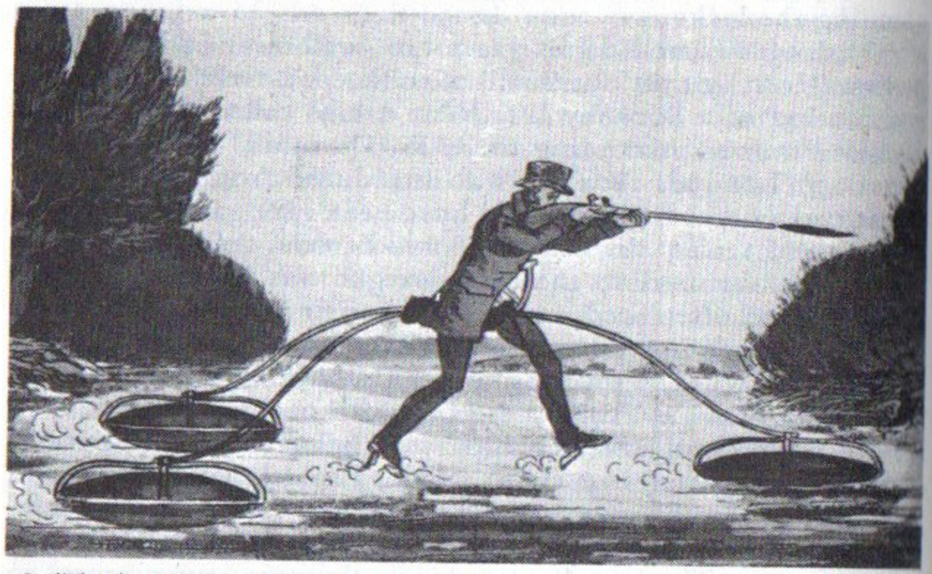
the gun designs in *Plusieurs Pieces d'Aarquebuzerie* published by the French gunmaker François Marcou in 1657 illustrates the breech of a gun of this pattern. Whether of over-and-under or side-by-side design the barrels of these seventeenth-century guns were separated by a narrow, full-length wooden stock. The technique of soldering the barrels together does not seem to have been introduced until the second quarter of the eighteenth century. Not long after this the half-length stock which made the manufacture of side-by-side double-barrelled guns an easier proposition began to gain in popularity. A curious example of a double-barrelled gun in the Scott Collection, Glasgow (Pls. 103–4), made in *c.* 1750, has many of the characteristics of the English turn-off pistol of the period. The barrels, set side-by-side and unstocked, unscrew at the breeches for loading; the single flint-lock has a box action and the alternate firing of the two touch-holes is controlled by a sliding pan cover. A similar box-lock action is on the fine double-barrelled gun in the Kremlin, Moscow (No. 504), made for the Empress Catherine II by Ivan Lialin. This action, however, has two locks and it breaks in two for the insertion of cartridges. The box-lock was suitable for pocket pistols but fitted to a gun gave the owner no chance of cleaning the locks.

The double-barrelled gun was not too well received in England at first. Even by 1781 it was still of sufficient novelty to merit the publication of a book by Dr. John Aikins called *Description of Double Firearms*. According to R. B. Thornhill, in *The Shooting Directory* (London, 1804), it was introduced from France 'as a great many other foolish things have been'. He gave the following reasons against the use of the two barrels: the second barrel was often not used so the extra weight was for nothing; the second barrel often fired accidentally; and finally, when reloading was being done in a hurry the two charges were sometimes put into one barrel. The sporting writer Colonel Thomas Thornton dismissed them as 'trifles, rather nick-knacks than useful'.[43] When these derogative remarks were being written, however, English gunmakers like Henry Nock, Ezekiel Baker, and John and Joseph Manton were turning out superb examples of double-barrelled flint-lock guns and there seems to have been no lack of customers. The barrels were being shortened even more, so that a length of 30 in. was common. As Thornhill put it: 'the

difference of ten inches in a barrel produces no sensible difference in the range of the piece; it is therefore evident from every circumstance, that the short barrel is to be preferred'.[45]

Patent Guns

The flint-lock gun at the beginning of the nineteenth century was a different proposition to that of a hundred years earlier. Although still basically the same mechanism it had a swifter, smoother action and was less susceptible to breakdown or misfire, and there were many sportsmen who agreed with Thornhill when he wrote: 'The manufacture of Fowling-pieces has been brought to such perfection by different Gun-smiths, that it may be justly doubted whether any further improvement in them can be made'.[46] On the other hand there were many gunmakers, both professional and amateur, who felt that there was still room for some improvement, however small. It was the beginning of the age of patents as far as firearms was concerned. Some inventions were of great practical value, like Henry Nock's breech of 1787, which, with or without modification, was adopted by most English gunmakers. Some were too far in advance of their time. John Anderson (1726–96), the natural philospher and founder of



98. 'The Aquatic Tripod' or 'Water Hobbyhorse'. Crossing a stream with the aid of floats and foot paddles. From John Badcock's *Domestic Amusements or Philosophical Recreations* (1823).

the University of Strathclyde, was responsible for a number of mechanical inventions. These included a six-pounder gun with a compressed-air recoil absorber and a flint-lock fowling piece working on the same principle.[47] Others were mere fancy touches like Joseph Manton's patent lock of 1812 which emitted a 'pleasant and musical sound' when cocked. Joseph Egg patented and actually made an upside-down lock in 1813. One amusing contrivance for enabling a sportsman to cross streams and lakes in pursuit of his quarry was the 'Aquatic Tripod', a kind of water tricycle advertised by John Badcock in 1823 (Fig. 98).

Even the most enthusiastic of sportsmen began to see the absurdity of so much of it. William Maynard of London published in 1788 a cartoon of 'THE PATENT GUN that KILLS in ALL DIRECTIONS'.[48] On 16 April 1817 a certain Mr. Dignum sang the following song at the 38th anniversary dinner of the Old Hat Pigeon Shooting Club. Entitled A NEW PATENT SHOOTING SONG it sums up the situation nicely. The discerning reader will also appreciate the *double entendre* theme running through it and culminating in the last verse.

What lots of gun patents, 'tis wondrous I ween
We old jolly knights of the trigger have seen;
Patent pans, patent hammers, and waterproof locks;
Patent breeches and touch-holes, and patent shap'd cocks.
  Derry down, down, derry down.

Patent ribs, patent lips, patent barrels, with bore
Of large and small size, for each choice amateur;
With gravity catches, the sportsman's salvation,
And many more articles that mock calculation,
  Derry down, etc.

Like a globe patent shot, that in spite of fate must,
When impell'd by the force of Pigou's patent dust,
Go straight to its object without deviation,
And render death always a sure operation
  Derry down, etc.

The fire-proof flask that the powder contains
Defies all explosion or loss of your brains;
The self-filling shot-bag affords quicker fire—
This principle all shooting men must admire
  Derry down, etc.

Overloaded with patents of quackish invention,
A cure for bad shots is their honest intention:
But false to their purpose they green horns entrap
And render them worthy—a patent foolscap.
Derry down, etc.

The best of all patents in Lisle-Street came out,
For quick'ning the fire, and there's no one can doubt,
But fire in Lisle-Street some quickly have ta'en—
Though that fire, A-*las*! often causes much pain.
Derry down, etc.'[49]

Firearm Decoration

If some guns bristled with mechanical improvements and gadgets others were notable for the beauty of their decoration. On them were lavished the skills of several craftsmen, specialists in the carving and engraving of wood, iron, bone, and precious metals. At first, in the early days of firearms, these were of haphazard application, typical of a folk art. Then gunmakers began to take as their guide an artist's drawing or engraving of some hunting scene or mythological subject and incorporate details of it into the engraving of the metalwork or the inlay. The stock of a German wheel-lock gun of *c.* 1550 in the City Art Museum, St. Louis, U.S.A. (No. 74.39), is decorated with scenes from the Labours of Hercules, directly copied from the 1544 engraving of Hans Sebald Behan. The next step was for the artists to design formal patterns and decorative scenes to fit the shapes of the lock, butt plate (Fig. 99), sideplate, etc. Engraved designs of this kind were published in the sixteenth century but it was not until the second quarter of the seventeenth century that they began to be widely circulated and copied. By the end of the seventeenth century an international style had developed so that it is now difficult sometimes to tell the nationality of a gun merely from the style of its decoration, at least in north-west Europe.

Amongst the most important designs published in the seventeenth century were those of Philippe Cordier Daubigny (1634–44), François Marcou (*c.* 1657), Jean Bérain (*c.* 1650–67), C. Jacquinet (1660), and Claude Simonin (1685). Some of Bérain's designs were the inspiration of the Italian gunmakers working in chiselled steel. The Simonin albums, first published in France in 1685, were issued at a time when the French style

of flint-lock was making its triumphal progress all over Europe. A replica edition was published in Amsterdam in 1692, and, about the same time, Jakob von Sandrart also brought out editions in Nuremberg. Early in the eighteenth century came the designs of Claude Gillot, Nicholas Guérard, and De Lacollombe, all to be printed in several editions. Sometimes the gunmaker would follow one plate of designs in its entirety. Thus the silver inlay

99. Engraving on the buttplate of a German wheel-lock gun of *c.* 1580 (*Tower of London Armouries No. XII–42*). Note the two heavy ball-butted pistols carried in the saddle holster.

on the butt of the sporting gun made in Tula in 1752 for the Empress Elizabeth, now in the Tower of London (No. XII–1504), copies almost line for line, one of Guérard's engravings.[50] At other times the gunmakers would combine details from several sources ingeniously blending them together. The decoration on the flint-lock rifle in Windsor Castle made by Jacob Walster of Saarbrucken in *c.* 1760, is an example of this improvisation.

The silver-wire inlay on the butt is copied from De Lacollombe's *Nouveaux desseins d'Arquebusiers* of 1700 and 1730; the steel chiselling on the mounts and the gold encrustation work on the barrel are based on the engravings of his pupil De Marteau, published in Paris in 1744–9. In the middle years of the century the rococo system of asymmetrical scroll work became popular and also helped to submerge any local or national traits in decorative style. Many of the lavishly ornamented guns were never intended for serious use and took their place in a display cabinet from the beginning. It is hard to imagine anyone, even the Emperor Leopold I (1640–1705), for whom it was made, going out hunting with the flint-lock gun now in the Kunsthistorisches Museum, Vienna (No. D 237). Its butt is completely covered with stone cameos, garnets, amethysts, turquoises, and pearls.

Flint-lock Performances

Towards the end of the eighteenth century, particularly in Britain, there was a gradual trend away from decoration towards a concentration on the practical efficiency of the sporting gun. This, as we have seen, resulted in a spate of patent mechanisms and gadgetry. But all the comic results and stories should not be allowed to obscure the real achievements of the gunmakers and the actual performances of the flint-lock shotgun. Contemporary references and, indeed, modern trials reveal how surprisingly effective the latter was. As early as 1727 George Markland, in his *Pteryplegia; or, the Art of Shooting-Flying*, was advocating shooting at ranges of at least 40 yd:

> Full forty Yards permit the Bird to go,
> The spreading Gun will surer Mischief sow;
> But, when too near the flying Object is,
> You certainly will mangle it, or miss;

Peter Hawker appears to have shot at this range if he could, but he often resorted to longer distances. On 26 September 1819 he shot all day in the teeth of an 'equinoctial gale' being reduced to firing long-range snap shots, one blowing the head off a bird at 72 paces.[51] Thornhill, in his *Shooting Directory* of 1804, records a successful shot at 120 paces.

The last author conducted a series of experiments to find the

spread of shot and the penetration at certain ranges. The shotguns used were flint-locks loaded with a mixture of No. 1 and No. 2 shot (730 pellets) and the targets were approximately 2 ft. square. For penetration tests sheets of brown paper were set up. In 1910 W. W. Greener reported a very similar series of tests carried out with modern full-choked 12-bore breechloaders against circular targets of 30 in. in diameter. From the recorded results of Greener's tests I have extracted those relating to the use of No. 1 shot over the same ranges as those of Thornhill's tests in order to make a reasonable comparison. Unfortunately several factors are unknown. In Greener's tests the charge was $3\frac{1}{2}$ drams of powder and $1\frac{1}{4}$ oz. of shot; that of Thornhill's was not stated although from the number of pellets it looks as though it was a larger charge. It is difficult to gauge the thickness and toughness of Thornhill's brown paper compared with the strawboards which Greener used for penetration tests. Nevertheless the two contemporary reports are interesting and suggest that only over the longer range was the flint-lock outclassed.

	Range in yards	*No. pellets in target*	*No. sheets penetrated*	
Thornhill[52] 1804	40	240	32	Brown paper
	60	43	14	
Greener[53] 1910	40	100	30	Straw board
	60	50	21	

One can therefore believe some of the stories of the enormous bags which continental shooting parties recorded in the eighteenth century, especially as armies of beaters were usually employed to drive the game towards the guns. In Bohemia, in 1753, the Emperor Francis I with a party of 23 guns, over a period of 18 days, fired 116,209 shots. With this great fusillade they killed 19,545 partridges, 18,273 hares, 9,499 pheasants, and other game totalling 47,950.[54] Probably the largest bag of game ever shot in *one* day was recorded in Austria during October 1797. In 14 hours of shooting the Prince of Liechtenstein and 11 other guns disposed of approximately 39,000 head of game, mainly hare and partridge.[55]

Not so successful was the grand rabbit shoot arranged by Alexandre Berthier, Chief of Staff to Napoleon I, in honour of his Emperor. In true military fashion Berthier organized

everything down to the last detail of the sumptuous luncheon which preceded events; companies of beaters and squads of gun-bearers stood by. To ensure that a plentiful supply of game would be available Berthier had taken the precaution of purchasing hundreds of rabbits which were kept in captivity discreetly hidden from sight until the last moment. Unfortunately the rabbits became tame by the day of the shoot. When Napoleon advanced to do battle the rabbits needed no urging forward. They mistook the majestic hunter for the keeper who had fed them with their daily lettuce. Equerries vainly tried to beat back the hungry tide, but the Imperial Court and all its followers were forced to retreat to Paris, furry invaders still being flung from the windows of the coaches.[56]

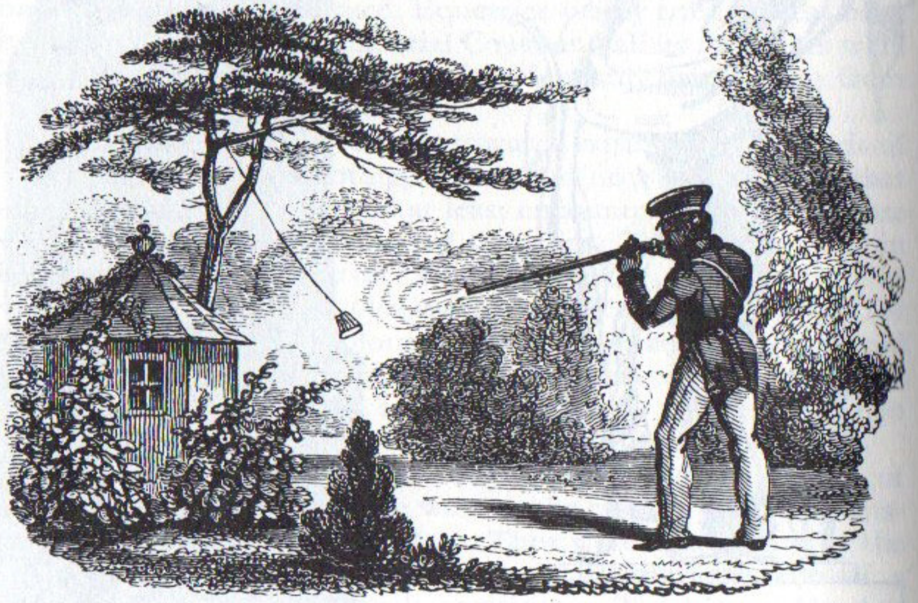
If Napoleon contributed little towards raising the standards of French sportsmen's shooting, which had now fallen below that of their British rivals, he did at least encourage the manufacture of some magnificently decorated shotguns. These were made in the State Arms Factory at Versailles under the direction of Nicolas-Noël Boutet, the *Directeur Artiste*.[57] They were noted for the lavish inlays of two-colour gold and silver and the sculptured quality of the furniture chiselled and engraved in the Empire style and to designs such as those engraved by Rennesson in 1807–8 under the direction of J. F. Lucas (Fig. 100).[58]

Neither excessive decoration on guns nor the gluttony of shooting massed driven game were to the taste of British sportsmen, at least in pre-Victorian days. They were more proud of the technical perfection of a firearm and the performance of a successful shot under difficult conditions. Thus Peter Hawker noted in his *Diary* for 4 September 1837: 'I was very lucky in "making cannons" today as I got two at a shot three times, and three at a shot once. This is the most consummate beauty and difficulty of the art . . .'[59] It must be admitted, however, that Peter Hawker always rejoiced in a mass kill. One of his great days was 26 October 1825 when, with one shot from his great gun, he blasted over 500 starlings out of the sky 'like a heavy fall of black snow'.[60] Sporting wagers were in great vogue at this time. Some of the contests give an idea of the skill of the marksmen. In December 1823 a wager of 100 guineas was made that Sir Robert Peel could not kill in the course of a day, a pheasant, a red-legged partridge, a common partridge, a snipe, a jack snipe,

100. Diana, Goddess of the Chase. *Left*: Design for a trigger-guard finial by Rennesson, *c.* 1807–8. *Right*: The trigger-guard finial of a gun in the Tower of London Armouries (No. XII–1278) made by the French gunmaker Nicolas-Noël Boutet for Charles IV of Spain, *c.* 1805.

a wood cock, a wild duck, a rabbit, and a hare. Peel began shooting at 10 a.m. and won the bet before 1 p.m.[61] One of the finest shots of his day, Squire Osbaldeston, was challenged to a 500 live-bird pigeon-shooting contest by Lord Kennedy for a stake of 2,000 guineas. The two men shot from a rise of 20–25 yd., Osbaldeston winning with 438 birds to 418.[62] Many Englishmen's ideas of sportsmanship were offended by the large-bore guns used on these occasions. As a 'Member of the Burton Hunt'

remarked in a letter: 'Mr. Osbaldeston . . . may as well carry a field piece as the gun with which he usually shoots his pigeon matches. Surely this cannot be called fair work when the barrel will admit of a crown piece down the muzzle.' For that matter some sportsmen considered it 'not done' to use double barrels. The obituary notice of John Hope of Tottenham, who died in 1831 aged 85, lauded him as 'so true a lover of fair play he would have scorned to use a double-barrel.'[63]



101. Learning to shoot at a moving target. From Baron de Berenger's *Helps and Hints* (1835).

Whilst the flint-lock shotgun had the range of the modern gun it certainly did not have its killing capabilities even though on the average the muzzleloader used a larger charge of powder and shot; nor did it have its quickness of fire. When the flint-lock was fired not only did the flash and smoke from the priming pan temporarily obscure the target but there was a perceptible space of time between the ignition of the priming and the explosion of the main charge. The ability of some sportsmen to overcome this when aiming at a moving target was quite remarkable. One of the great shots of the early nineteenth century Richard Toomer,

like Benvenuto Cellini (see p. 222), preferred to shoot with a single ball rather than with shot. He could shoot six out of ten pigeons like this. On one occasion, on a cricket pitch near Hartford, he hit a cricket ball twelve times between the wickets when bowled by Harris, one of the fastest bowlers in England.[64]

In 1889 R. W. S. Griffith made some comparative tests to establish the time taken for the charge to reach the muzzle after the fall of the cock in the case of each type of gun, the flint-lock and the cartridge gun. The times were as follows:

Flint-lock	from ·0750–·1050 sec.	*Ave. = ·094 sec.*
12-bore Breechloader	from ·0039–·0063 sec.	*Ave. = ·005 sec.*[65]

Percussion Locks

Many inventors tried to overcome this disadvantage of the flint-lock. Patent touch-holes and breeches helped to ease the path of ignition; concealed or covered locks to some extent disguised the effects of the priming. But misfires and the time lag—sometimes developing into a hang-fire—continued. In 1807, however, the Scottish clergyman, Alexander Forsyth, took out perhaps the most important patent in the history of firearms. He had succeeded in constructing a lock which utilized the detonating powers of a fulminating powder to ignite the charge in the barrel. The explosive powers of fulminates had been known since the seventeenth century but all the experiments that had been conducted up to Forsyth's time, with gold, silver, and mercury, appear to have been aimed at the substitution of the fulminate for gunpowder. As some of the chemicals would explode on the touch of a feather nearly all these experiments ended in disaster or, at the least, discouragement. Forsyth was able to take advantage of the recent discovery of a safe process for making fulminate of mercury and also the results of his own experiments with oxymuriatic salts. After a short period spent in the Ordnance workshops of the Tower of London, he managed to devise a satisfactory method of converting existing flint-locks to a percussion lock in which a small quantity of fulminate was detonated by a hammer and the flash diverted into the touch-hole. Although his locks were turned down by the Board of Ordnance as being unsuitable for military use he was able to start a gunmaking business in London to capitalize on his discovery.[66]

The Forsyth Patent Gun Company started in Piccadilly, London, in 1808 and in Scotland the guns were marketed by the Edinburgh gunmaker James Innes. On 6 May 1809 the latter inserted an advertisement in the *Edinburgh Evening Courant* in which he informed 'the nobility and gentlemen' of the advantages of the new lock:

> The priming is impervious to damp, the inflammation instantaneous making the aim much more certain; and, from the complete ignition of the charge, the effect produced in the firing of the gun, is increased one third, both in strength and closeness.

Trials soon showed that these claims were not far short of the truth. The difficulty lay in the construction of the locks which had to be made with precision to ensure proper functioning and in the manufacture of the powder. Although Forsyth tried to prevent them by invoking the powers of his patent, other gunmakers began to experiment with alternative forms of detonating or percussion locks.

Both in England and on the continent different ways were found of using the detonating substances: as a powder in a magazine which rotated or slid into position for the deposition of the required quantity; as a pill fed singly or by means of a magazine on to a nipple; in a paper disc or patch placed on a nipple or fitted in the cock; in a copper tube inserted directly into the touch-hole; in a continuous tape and, finally, in a copper cap. All these systems necessitating various forms of mechanisms to detonate them had their advantages and their disadvantages, but from *c.* 1825 the copper cap began to be recognized as the safest and most trouble-free form of percussion ignition. An English artist Joshua Shaw, appears to have taken the idea to America in 1819 where he was eventually awarded a large sum for his discovery. But it was developed to an equal extent in England by the gunmakers Joseph Egg, Joseph Manton, and James Purdey; and, in France, by the gunmaker Prélat who took out a patent *certificat d'addition* for the cap in 1820.[67]

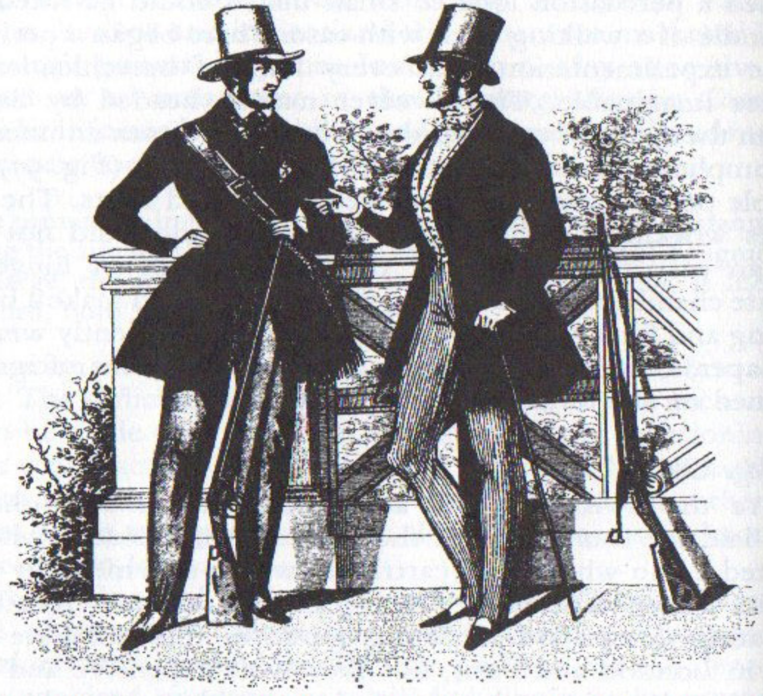
The copper cap was like a miniature top hat, which, with its crown filled with detonating powder, fitted over an iron nipple screwed into the barrel as near to the chamber as possible. The hammer needed to detonate it could be made with the simplest of mechanisms. In 1823 John Day of Barnstaple, England,

patented a percussion lock so small that it could be fitted into the handle of a walking stick with ease. There began a period of intense experimentation with every kind of breechloader and repeater imaginable. The revolver makers headed by Samuel Colt, in the space of two decades, were able to turn an uncertain and complicated flint-lock revolver like the Collier (Fig. 97), into a simple pocket weapon firing five or six rapid shots. The gunmakers working on the design of breechloaders did not have such an easy task. Using all the old methods of hinged or separate chambers, movable plugs, etc., they could make a breech opening and fill it with powder and bullet conveniently wrapped in a paper, skin, or rubber cartridge, but the means of ignition remained on the outside to complicate matters.

Cartridge Guns

In 1812 the Swiss inventor and balloonist Samuel Johannes Pauly laid the foundation of the modern breechloader when he patented a gun which used cartridges with a soft metal or wood base in whose centre had been planted a cap or 'rosette' of detonating compound. Sporting guns on this principle were made in London and Paris, but they were expensive and there were difficulties in replenishing the cartridges. Another gunmaker J. A. Robert patented a modified version of the Pauly gun but although some fine decorated specimens of the Robert system were made, they did not succeed in overcoming entirely the cartridge problem (Fig. 102 and Pl. 112). Another early cartridge breechloader, well in advance of its time, was that patented in France in 1826 by Antoine Galy-Cazalat in which the cartridge was detonated by an internal bolt.

In an 1832 patent the French gunmaker Casimir Lefaucheux revived the old seventeenth-century break-action type of breech. For this and for many other breechloaders the cartridge used was, in effect, the old muzzleloading cartridge with the addition of a nipple or anvil projecting from its base for the percussion cap to be seated on. Some cartridges were self-consuming; if they were not, extraction after firing presented problems. Lefaucheux followed up the success of his breech action by inventing an entirely new cartridge in 1835. This had a percussion cap or pellet embedded in its base where it could be detonated by a pin jutting out at right angles. The pin-fire cartridge, as it became



102. French sportsmen armed with the breechloading Fusil Robert and dressed by Messrs. Benoist & Degrement, Paris. From *Modes de Paris*, c. 1845.

known, was soon modified with a metal rimmed base which made extraction easy. The cartridge became immensely popular amongst the sporting fraternity of France and Belgium, and to a lesser extent in Britain where it was exploited mainly by the London gunmaker Joseph Lang.

In Germany the bolt-action type of breech was developed with the aid of needle-fire cartridges introduced in 1827 by a former workman of Pauly, von Dreyse, who had returned to his native Prussia. The needle-fire cartridge with the detonating pellet inside the cartridge between charge and bullet was not only popular in hunting circles (Pl. 135), but was adopted by the Prussian Army in 1840. In England Joseph Needham patented a needle-fire breechloader in 1852, and a number of double-barrelled guns with his curious swing-out breech bolts were made (Pl. 115).[68] Both systems, however, were open to objections. The pin-fire cartridge was inconvenient to handle and placed limitations on

the design of the breech which was susceptible to gas escape at the pin-hole; the needle-fire mechanism was liable to breakdown because the bolt or needle had to pass through the powder and was subjected to the force of the resultant explosion. In 1847, in France, Bourcier patented a centre-fire breechloader which had several modern features like a diagonally-striking firing pin and an automatic ejector; but like all imaginative breech mechanisms of its time it lacked the necessary cartridge to fulfil its proper function.

The final steps in the design of the cartridge were taken by the French gunmaker Pottet when he patented, in 1855, a centre-fire cartridge with an advanced design of detonator. Minor improvements put forward by François Schneider, were purchased and brought to England by George Daw, the London gunmaker. The Superintendent of the Royal Laboratory in England, Colonel E. M. Boxer, set the seal on the new cartridge by patenting a small modification and getting it adopted by the British Army in 1866. With a grand disdain of history all these events were summed up by G. T. Teasdale-Buckell, in 1900, when he wrote: 'From 1834 to 1857 nothing new occurred to the fowling-piece; the flint-lock had been abandoned, except by the most conservative sportsmen, and the breechloader was brought from France by the late Mr. Joseph Lang. It took some ten years to become universal, for, to say truth, a good many of the new guns were more noted for their escape of gas at the breech than for their killing powers.'[69]

From 1860 to 1880 was a period when the sporting world could take its pick of an amazing variety of firearms from flintlocks to cartridge arms of all kinds. Some sportsmen still remained faithful to the old percussion muzzleloader which, when speed of loading was not essential, could outshoot the new breechloaders, and for which cap, ball, and powder could be obtained in most parts of the world. Other sportsmen tried out each new breechloader as it appeared. The sportsman and author, H. A. Leveson, discussing various models in the first edition (1860) of his book *The Hunting Grounds of the Old World* wrote: 'Arms are still in a transition state, and it is yet a matter of doubt as to which principle is the best.' But he had no doubt as to the advantages of the breechloader over the muzzleloader. As he pointed out, it was easier to load and clean and the charge

could be changed without difficulty or mess. Because it was so quickly reloaded the sportsman on safari no longer needed a battery of guns and bearers. 'Now', said Leveson, 'he may roam through the forest alone, careless as to what animal he may meet, for he knows that, should his first shots not take deadly effect, he can reload in the twinkling of an eye, and keep up a running fire against which nothing can stand . . .'[70]

By this date British sportsmen had become converted to the continental idea of driven game and record bags. They did, indeed, keep up a 'running fire' over their native moors the like of which will never be heard again. The Marquess of Ripon is a good example of the sportsman of this time whose fanatical interest in shooting seems to have outweighed all other interests. From 1867 he kept a record of his kills. His lifetime total was:

Grouse	97,503	Black game	95
Partridge	124,193	Capercalzie	45
Pheasant	241,234	Hares	31,934
Woodcock	2,560	Rabbits	40,138
Snipe	2,926	Various	12,616
Wild duck	3,569	*Total*	556,813

The record ended on 22 September 1923. On that date the aged enthusiast was shooting on Dallowgill Moor near Ripon and at 3.15 p.m. having shot 165 grouse and one snipe he dropped dead in his seventy-second year. It was this kind of shooting which aroused the *New York World*—conveniently forgetting the American massacre of the buffalo—to comment on 3 September 1904:

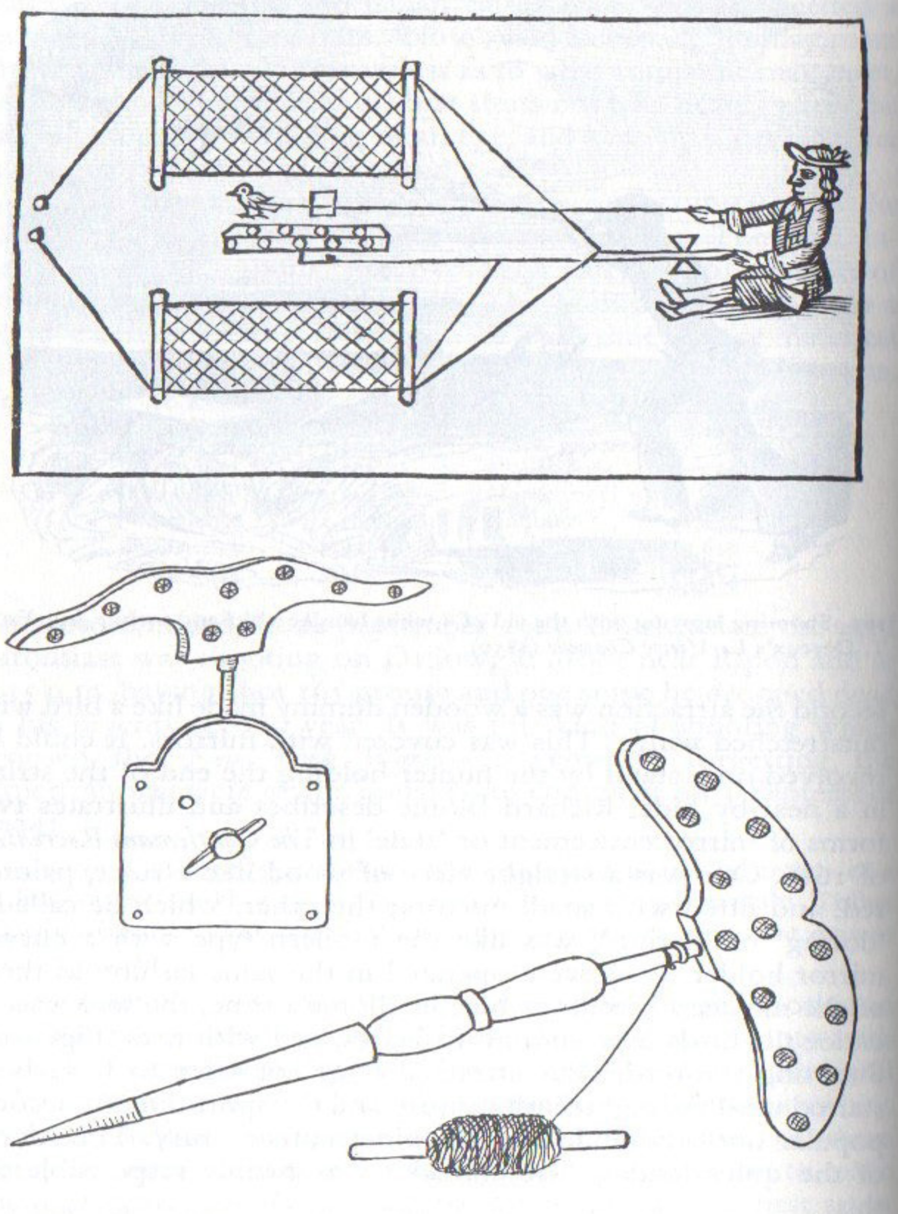
A curious idea of 'sport' that! The crude and brutal mentality of a 'ruling class' which can joy at such slaughter may explain Thibet expeditions and other bloodstained iniquities where men, not grouse are the quarry.

The French were noted for two unusual forms of shooting in which they seem to have specialized—shooting at lapwings with the aid of a white handkerchief (*tir des vanneaux au mouchoir*) and at larks with the aid of a moving mirror (*tir d'alouettes au miroir*). In both shoots the hunter relied on the curiosity of these normally gun-shy birds when sighting an unusual object to make them descend near the ground to investigate. In the first sport the hunter placed a white handkerchief on the ground and preferably employed a white dog to move round it (Fig. 103). In the

103. Shooting lapwing with the aid of a white handkerchief and a white dog. From T. Deyeux's *Le Vieux Chasseur* (1850).

second the attraction was a wooden dummy made like a bird with outstretched wings. This was covered with mirrors. It could be revolved on a stand by the hunter holding the end of the string in a near-by hide. Richard Blome describes and illustrates two forms of mirror enticement or 'stale' in *The Gentlemans Recreation* of 1686. One was a straight piece of wood like a ruler, painted red, and fitted with small mirrors; the other, which he called a 'doring' or 'daring', was like the modern type with a curved mirror holder. Both were operated in the same fashion as those of the nineteenth century but, in Blome's time, the idea was to entice the birds near enough to be trapped with nets (Fig. 104). Shooting the birds thus attracted does not seem to have been started until the eighteenth century and the sport did not become popular until the middle of the nineteenth century. The advent of the quick-loading breechloader was mainly responsible for this.

The English fowler and twentieth-century exponent of the crossbow, Daniel Higson, gave this description of 'twirling for



104. *Above*: Trapping birds with revolving mirrors, a live decoy and nets. From R. Blome's *The Gentlemans Recreation* (1686). *Below*: Mechanical and hand-operated French lark mirrors, nineteenth century.

larks'—a translation of part of Leon Reymond's *La Chasse Pratique de l'Alouette au Miroir, au Sifflet et au Fusil*:

It is especially when the lark flies at a height of 40 or 50 yards that she throws herself on the mirror. Nothing is more graceful than this fall—the bird, stretching out her feet, closes her wings and falls as a stone from the sky, at some hands' breadths of the mirror, opening the wings, hovering as if charmed above the glasses, offering the image of the 'saint esprit' which ornaments the pictures of the old masters. The noise, the movement, a shot, nothing can upset this ecstacy which endures several minutes. She is then very easy to shoot, and, with a little practice, one misses very rarely.

When the passage is abundant and the larks are animated with this goodwill to pitch upon the mirror, one should have a wheelbarrow full of cartridges—one can shoot all the morning, having trouble to load the gun, the barrels scorching the fingers. One finishes by being deaf; the eyes are dazed, and, although seated quietly on a mound of turf or on a folding seat, the perspiration courses down the face as if taking violent exercise. The slain scattered on the ground, the feathers flying on all sides—this is a scene full of pleasure and animation which would cheer up an Englishman attacked by the spleen.[71]

Few Englishmen appear to have agreed with the writer but there is little doubting the average Frenchman's enthusiasm for the sport. Here again there is the emphasis on the mass kill.

During the months of October and November, on Sundays in the environs of Paris is offered a joyous spectacle. All the shooters, little shopkeepers, of the great city embark by the first morning trains for the country to make a war to the death upon the larks. There is a mirror in each game-bag. They are installed one after the other, and the first bird which adventures in the middle of this redoubtable army is saluted by a fearful fire enough to kill a rhinoceros.

Twenty shooters dispute a lame chaffinch, and a wounded lark is pursued by a band of finished shooters, each of whom claims the honour of the shot which has dropped the little creature. Indefatigable hounds, composed of bassets, poodles, terriers, etc. run at each shot, pulling at the fragments of some audacious sparrow which has tried to clear the line of mirrors. The green forests resound with the whistles of all sizes and calibres playing airs and variations to the frightened birds.

At noon the plains are silent; the massacre has taken place, and, fork in hand, with new objects in view, the shooters new laurels gather. The tales signalising remarkable shots of the morning fly from mouth to

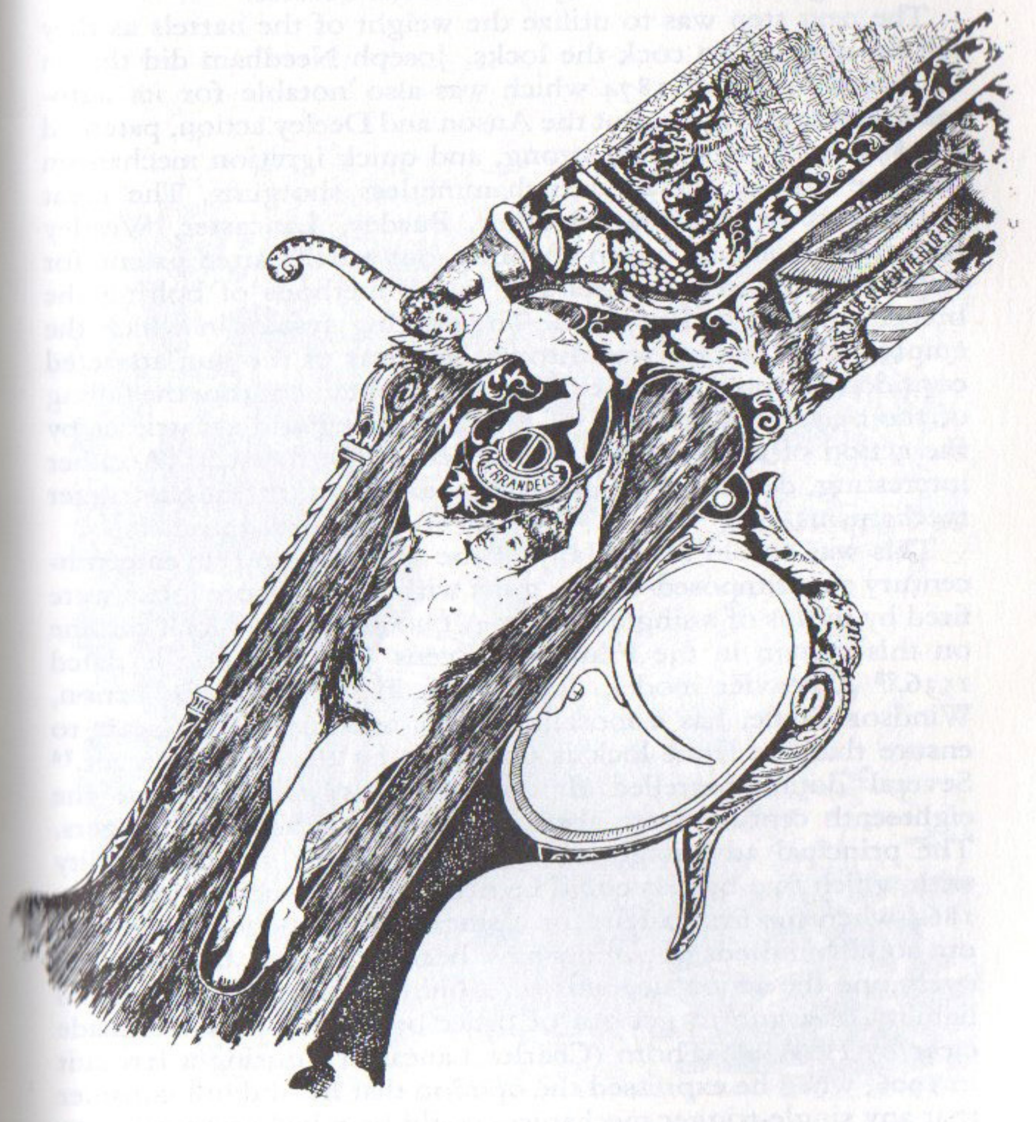
mouth, the fortunate ones boasting, and the unsuccessful drowning their sorrows in the pot.

And in the evening, counting the cost, shake their heads.

Ah it is a grand day for the shooters—Sunday in the environs of Paris.

All this fast and furious shooting can be traced to the adoption of the centre-fire and pin-fire cartridges which very quickly had their effect on the design of the breech actions. The various experimental actions of the 1850s and 1860s with barrels which moved forward, swung sideways, turned over, etc., began to disappear and the breechloader with the drop-down barrel or snap-action became the most popular shotgun of all. But it was still a long way to perfection—if that could ever be attained. In the 1870s gunmakers in Europe and America vied with each other in the race to perfect barrels, locks, and breech systems. Interest was stimulated by public trials organized by such periodicals as *The Field*, in Britain, and *The Turf, Field and Farm*, in America.

The advantages of guns without exterior mechanisms had long been appreciated. In the eighteenth century muzzleloading double-barrelled guns with concealed flint-lock actions were made but these were only partly successful because of the frailty of the locks.[72] When the percussion system was introduced no difficulty was experienced in making the locks inconspicuous, but combining them with breech actions still presented problems. The advent of the metallic cartridge gave the gunmakers their chance. The early Dreyse sporting breechloaders provided some indication of the possibilities. An under-lever was pulled down, sliding the barrels forward for loading and pulling back the needle hammers to the cocked position in one movement. When Dreyse discarded the needle-fire for centre-fire he used a breechloader with an under-lever which was pushed sideways to achieve the same effect. Other gunmakers began to employ the action of the lever which opened the breech to cock the hammers as well. Some of them, like Joseph Lang, using the orthodox side-action locks, fitted dummy hammers to indicate whether the gun was cocked. Others compromised with the semi-hammerless gun in which headless hammers moved on the outside of the lock plates. George Daw in *c.* 1862, Green in 1866, were amongst the gunmakers who produced breechloaders which were opened



105. Decorated breech and lock of a gun by F. Brandeis. From R. Corneli's *Die Jagd und ihre Wandlungen in Wort und Bild* (1884).

and cocked by the movement of the under lever. Nearly all were clumsy in opening and it was not until Theophilus Murcott patented his breechloader in 1871 that the hammerless breechloader began to achieve any commercial success.

The next step was to utilize the weight of the barrels as they fell on opening to cock the locks. Joseph Needham did this in his breechloader of 1874 which was also notable for its automatic ejecting system. But the Anson and Deeley action, patented in 1875, with its simple, strong, and quick ignition mechanism was the first of the modern hammerless shotguns. The great gunmakers of this era, Greener, Purdey, Lancaster, Westley Richards, Holland, began to bring out patent after patent for improvements in the locks and in the methods of bolting the breech in its closed position. The ejecting system in which the empty cartridge case was thrown out clear of the gun attracted considerable attention; the power being obtained from the falling of the barrel, the strength of the mainspring and sometimes by the action of a special lock concealed in the fore-end. Another interesting development was in the design of single-trigger mechanisms.

This was an old idea. Many of the sixteenth and seventeenth-century superimposed-charge guns with two or more locks were fired by means of a single trigger. A two-shot wheel-lock carbine on this system in the Frank E. Bivens Jr. Collection is dated 1536.[73] A heavier model, dated 1606, in the Royal Collection, Windsor Castle, has a most ingenious arrangement of sears to ensure that the front lock is fired first by the single trigger.[74] Several double-barrelled flint-lock pistols and guns of the eighteenth century were also constructed with single triggers. The principal advantage of the single trigger was the facility with which two barrels could be fired in quick succession. Since 1864 when the first patent for a single trigger action was taken out some hundreds of patents have been registered, but in nearly every one the action depends on a hidden spring. The increased liability of a gun to get out of order because of this was made clear by H. A. A. Thorn (Charles Lancaster), during a law suit in 1906, when he expressed the opinion that he 'did not consider that any single-trigger mechanism could be relied upon never to go wrong in use'.[75] By this date there was little purpose in complicating the shotgun merely for the purpose of extra speed. It

106. Edwardian sportswoman and loader. From Charles Lancaster's *The Art of Shooting* (1906).

was not necessary. On 30 August 1888, for instance, between 5.15 a.m. and 7.30 p.m., Lord Walsingham killed 1,070 grouse over Blubberhouse Moor using four centre-fire breechloaders and 1,510 cartridges. In other words, for over 14 hours he kept up an *average* rate of fire of 108 shots per hour. This feat was, of course, accomplished with the aid of one or more loaders. W. W. Greener claimed that one of his ordinary double-barrelled ejecting shotguns had fired 26 aimed shots in less than one minute when the trial had to be discontinued as the barrels had become too hot to hold.[76]

Nevertheless in America, where the magazine rifle had had singular success, gunmakers designed repeating shotguns, although the bulky cardboard cases of the cartridges passing through the actions caused some difficulties. One of the first successful designs was patented by C. M. Spencer and S. H. Roper in 1882. This was a slide or pump-action model. Five cartridges housed in a tubular magazine under the barrel were brought into the barrel one by one by the left hand moving a handle back towards the trigger. In the Winchester model 1887 repeating shotgun the action was motivated by the trigger-guard lever being pushed downwards by the right hand. These movements of the hand and arm in reloading inevitably unsteadied the aim. It was only when the Remington Arms Company decided to manufacture John Browning's automatic shotgun in 1905 that the hunter could at last fire a number of cartridges without reloading by the simple act of pulling the trigger.

Sportsmen remaining faithful to the traditional double-barrelled shotgun, however, could still point to one disadvantage of all shotguns firing through one barrel—there was no choice of shot pattern. This hinged on the methods of boring the barrels. The effectiveness of a shotgun depended in the main not on its rate of fire but on the pattern of shot it delivered at a required distance. Gunmakers had always been concerned to prevent the shot spreading too widely or unevenly over the longer ranges. Various and conflicting ideas as to the method of preventing this had been voiced in the past. The Spanish gunmaker Martínez de Espinar, writing in his treatise *Arte de Ballestería y Montería* of 1644, considered that if the gun would not give an even pattern it should be opened out at the muzzle.[77] Later gunmakers also agreed that widening the muzzle made the shot closer. The

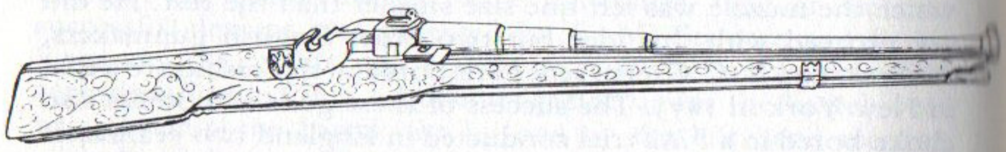
French writer G. F. Magné de Marolles, in his *La Chasse au Fusil* of 1788, however, noted that some gunsmiths narrowed the barrel in the middle and others narrowed it gradually from breech to muzzle in order to get the same effect. Colonel Hawker liked a muzzleloading gun to have its breech 'tight behind' or constricted and its muzzle 'relieved' or funnel shaped. The main portion of the barrel was, of course, cylindrical. Many gunmakers especially in America had some system of boring the barrel so that it was constricted or 'choked' near the muzzle. One of these, Jeremiah Smith of Smithfield, Rhode Island, is known to have bored barrels in this way as early as 1827. In 1866, however, William Pape, a gunmaker of Newcastle, England, took out a provisional patent for a method of boring barrels in which the muzzle was left one size smaller than the rest. He did not proceed with this idea but two other English gunmakers, W. Scott and E. C. Green, sent guns bored in this fashion to a trial in New York in 1873. The success of these guns and others also choke-bored in a *Field* trial conducted in England two years later finally resolved most experts' doubts as to the value of the choke.

A late development in shotgun design was the revival of the old three- and four-barrelled guns. In 1881 Lancaster's four-barrelled gun was patented and in 1883 a three-barrelled in-line shotgun, with three triggers and selective ejectors, was introduced by Dickson and Murray. The Gloucester firm of E. C. Green & Sons patented in 1902 another three-barrelled gun with the barrels arranged in clover leaf section. In British sporting circles however, the double-barrelled gun remained the most popular, giving the sportsman a choice of cylindrical or choked bores. On the continent where the availability of game merited it the double-barrelled shotgun was often fitted with a third, rifled barrel of small bore, the combination being known as a 'drilling'.

Rifles

The date of the introduction of rifling—the cutting of grooves in the bore of a gun—is not known but it seems likely to have occurred in the second half of the fifteenth century. There are two early references to what may have been rifles, one in a 1476 inventory of the Turin armoury and the other in a 1479 inventory of the Nuremberg castle. In the first a gun is described as

'*sclopetus unus ferri factus a lumaga*'[78] (i.e. a gun of twisted iron); in the second four barrels are said to have been made '*cum rugis per cochleas bullantibus*'[79] (i.e. with ridges performing spirals). Rifling may have been mentioned in the records of a target competition at Leipzig in 1498.[80] A German handgun of *c.* 1500 in the W. G. Renwick Collection, U.S.A., has what appears to be traces of rifling down its barrel.[81] (Fig. 107). The earliest firm evidence of rifling, however, is the German wheel-lock gun in the Tøjhusmuseum, Copenhagen (No. B 277) whose rifled barrel is dated 1547. Not long after this date, in 1556, the municipal council of Berne in Switzerland prohibited the use of spiral or otherwise twisted barrel-grooves for target shooting. This may



107. Handgun in the W. G. Renwick Collection believed to be one of the first rifles. Bears the arms of Maximilian I (between 1493–1508) and was formerly in the Meyrick Collection. As drawn by Joseph Skelton in his *Engraved Illustrations* (1830).

have been done solely on the grounds of equity for the merits of rifling were obviously recognized by this time and, in 1575, spiral rifling was praised by the poet Fischard in his work *Affentheuerlich Geschichtsklitterung*.[82]

The notion of rotational stability was known in the fifteenth century—crossbow bolts often had their feathers off-set for this reason—but how far gunmakers appreciated the advantages of making a spherical ball spin on an axis parallel to the line of its trajectory is difficult to judge. What gunmakers did understand was the need to make the ball fit tight to the barrel so as to reduce the windage or escape of gas to the minimum. Unfortunately hammering a ball—whether wrapped in a patch of suitable material or not—down a barrel for effective loading became virtually impossible after a few rounds because of the fouling or residue left by the combustion of the coarse gunpowder then in use. Rifling grooves may have been cut in the first place merely as an anti-fouling remedy, and, in fact, some early rifles have straight grooves.

However, whatever the original reason for their introduction, spirally-rifled barrels soon became common, especially in Germany. Lucas Cranach, who shared the Elector John Frederick's captivity at Innsbruck during 1547–52, left notes describing how they used to pass the time shooting with the long and short *Pürschrohr* or rifle. The shooting diary kept by Duke Albrecht V of Bavaria records that between 1555–79 he killed 4,783 deer apparently with firearms, the majority of which would have been rifled. His Duchess who was fond of stalking had two special light rifles (*Birschbixen*) made for her at the cost of 60 florins.[83] All these rifles would undoubtedly have had wheel-locks. Towards the end of the sixteenth century gun-makers went so far as to experiment with double-barrelled over-and-under rifles. A fine German wheel-lock piece of this construction in the Royal Collection, Windsor Castle (No. L 327), is dated 1588. Another specimen, formerly in Schloss Benatek, Bohemia, was dated 1592.[84] These compact but heavy rifles could weigh as much as 15 lb., but on the average the ordinary single-barrelled wheel-lock rifle weighed between 8 and 10 lb. A few rifles, made extra light for the use of boys or women, went down to 6 lb. in weight. The barrels of wheel-lock rifles rarely exceeded 48 in. in length; the calibres were usually under ·75 in. Two very light wheel-lock guns in the Kunsthistorisches Museum, Vienna (Nos. D 306 and HGK 389), have bores of approximately ·22 in.

During the first quarter of the seventeenth century much lighter wheel-lock rifles, known as *Tschinke* were developed in Silesia and Bohemia for the purpose of stalking birds either on the ground or in the trees (Pl. 88). Distinguished by their curious dipping butts and wheel-locks with external mainsprings, their calibres were usually around ·3 in. They varied in weight from 4–8 lb. During the seventeenth century, in keeping with the development of the smoothbore gun, the wheel-lock rifle was subjected to all the experiments with breechloading and multi-shot actions. An interesting modification found only on the rifles was the supplementary rifled barrel which could be screwed into the main barrel and enabled the huntsman to have the choice of small or large calibre bullets. A rifle with this accessory in the Kremlin, Moscow (No. 6493), is signed CASPAR SOMMERFELD IN BRESLAW 1668. Earlier examples were made by Sigmund and Cornelius Klett of Salzburg. At least two are signed SIGMUNT

KLET INVENTOR 1652, one in the Royal Collection, Windsor Castle (No. 309), and the other in the Kunsthistorisches Museum, Vienna (No. D 292).

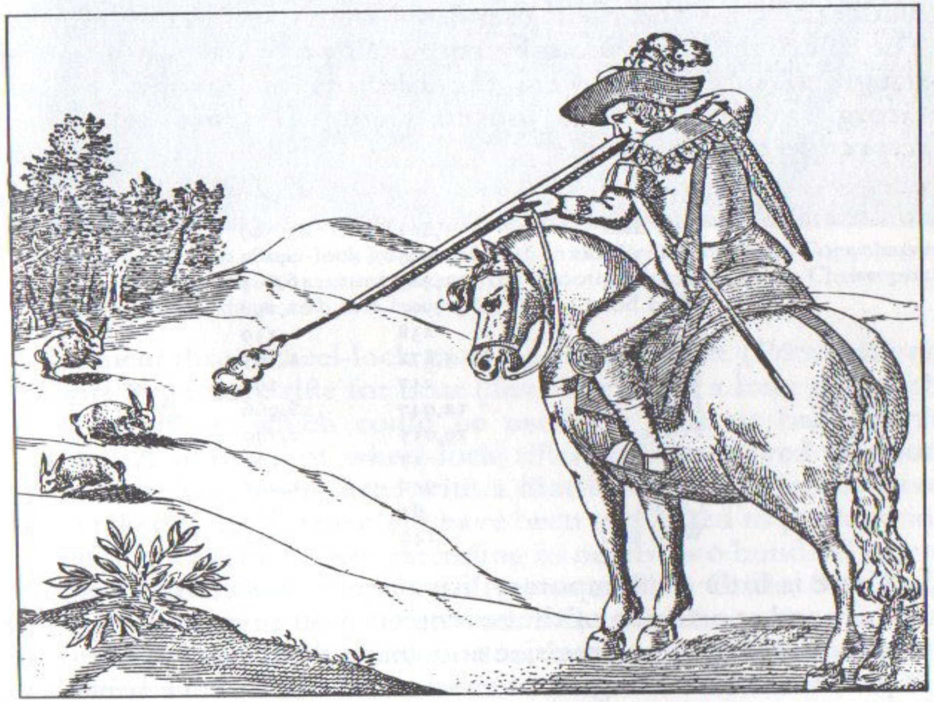
The introduction of the French type of flint-lock early in the seventeenth century did not have the same impact on the design of rifles as it did on that of the shotgun. French gunmakers apparently showed little interest in the rifle. The Spanish authority Alonso Martínez de Espinar, in his *Arte de Ballestería y Montería*, first published in 1644, regarded the wheel-lock as obsolete and had this to say on the rifle:

there are other guns marked inside with grooves which in the length of the barrel usually make a half, one, or one and a half turns and this is done according to whether the Master prefers a large or small number of grooves. Some grooves are very fine and close and others wider, deeper and farther apart; the latter are the best, but whether there are more or fewer of them is according to taste. The best arrangement is to have seven or nine grooves in a barrel which fires a charge of three and a half to five drachms which is sufficient to kill a bird with a bullet . . . its greater strength depends on the pressure applied in the loading. Some wads of felt cut with a punch adjusted to the mouth of the barrel must be made; they must be tarred with Greek pitch, wax, and tallow. When all this is melted the wads are put into it and after they have absorbed the pitch they should be left to cool, and then they become very hard and lubricated. They are very important for the grooved guns because they facilitate the entrance of the bullets, for they too have to be well adjusted to the barrel so that by blows from the ramrod they are carried deep into it, and by entering this way they cannot be used for two shots on account of the dirt left by the powder and must be washed, and to make this unnecessary, and in order that up to a dozen shots may be fired, these wads are put in and carry down the dirt left by the powder and they leave the barrel clean and lubricated by the pitch. Also as they enter under pressure this stops the gas escape which regulates the distance fired, for the fire can then exert more force.

Other European gunmakers continued to make the traditional form of wheel-lock rifle with the short butt which was pressed against the cheek during firing. In the second half of the century, however, flint-lock rifles with the normal shoulder stock began to be popular, especially in Germany and Poland. They were similar to the wheel-lock rifles in being fitted with large trigger-guards, sometimes shaped for the fingers. This, however, was done mainly because of the extensive use of double-action set

or hair-triggers, both on the flint-lock and wheel-lock rifles. The use of such delicate 'let-off' actions, which appear to have been introduced on crossbows as early as the sixteenth century, presupposes that the barrels were capable of some accuracy and this is borne out by the fact that a number of rifles were provided with optical sights.

Few of these interesting but fragile accessories have survived. Some of the Austrian emperors suffered from bad sight and, in the Kunsthistorisches Museum, Vienna, there is a suite of wheel-lock rifles by Joseph Hamerl of Vienna (1725–38), with off-set stocks, some of which have rear sights with lenses. At Rosenborg Castle, Copenhagen, is the wheel-lock rifle of Frederick III (1609–70). On top of the butt, behind the neck, is set a gold-rimmed spectacle lens (optic: + 0·75), to act as a rear sight. The majority of seventeenth-century barrels were of octagonal section and it may be that the external appearance of the barrel in many cases influenced the choice of the number of grooves used in the



108. The mounted shot. From G. de Tapia y Salzedo's *Exercicios de la Gineta* (1643).

rifling, for eight was by far the most popular number. There was, however, a great variety in the designs of the rifling both as to the number of grooves and the kind of groove, which could be—in section—square, curved, pointed, deep, or shallow. How accurate these barrels were when used with contemporary gunpowder is difficult to judge. Gunmakers were not confident enough then to state the distances on the sights as they did in later years. In Germany, Austria, and Czechoslovakia where shooting competitions were popular in the sixteenth and seventeenth centuries, ranges were built to allow for distances from 125 to 200 paces.[85] It is probable that most huntsmen shot well within these distances.

By the seventeenth century the wealthy sportsman did not need to bother with long-range work for already the practice of driving massed game towards the guns was being adopted. In central Europe vast areas of the countryside were marked out in scientific fashion so that herds of animals of all kinds could be beaten up, driven, and finally funnelled past a shooting stand where the guns and their attendants were comfortably housed. The cult of the great *battues* had begun. Two of the most fanatical slaughterers of game were the Electors of Saxony, Johann Georg I (1611–56) and Johann Georg II (1656–80). Their respective records were:

	I	II
Red deer	35,421	43,649
Fallow deer	1,045	2,062
Roe deer	11,489	16,864
Wild boar	31,902	22,298
Bear	238	239
Wolves	3,872	2,195
Lynx	217	191
Hares	12,047	16,966
Foxes	19,015	2,740
Beavers	37	597
Badgers	930	1,045
Otters	81	180
Wild cats	149	292[86]

There is little contemporary literature to show what the gunmakers and sportsmen of the seventeenth century thought of the problems of rifling, of the size and shape of the bullet, the types of grooves and the degree of twist. It seems to have been very much a case of getting to know the peculiarities of one's own

rifle and the charge most suited for it. Whatever changes were made in the kind of gun lock there was little alteration made in the design of the rifled barrel.

The old-style wheel-lock rifle continued to be made in Germany well into the eighteenth century. The artist Ridinger drew his hunters armed with wheel-locks or flint-locks, sometimes with both in the same scene, as in the engraving of the deer hunt, *Der Ohrstand auf die Rehe*. H. F. von Fleming in his *Der Vollkommene Teutsche Jäger* of 1719 illustrates in a plate of hunting

109. Butt of Danish wheel-lock gun dated 1636 in the Tøjhusmuseum, Copenhagen (No. B 196). Silver-plate commemorates the shooting by the owner Christopher Lindenov of two stags with one bullet in 1652.

equipment three wheel-lock guns—a stalking rifle (*Pürschbüchse*), a short large-bore rifle for boar (*Sau Stütz*), and a long gun with straight rifling which could be used for shot or ball (*Schrot Büchse*). A number of wheel-lock rifles, still preserved in good condition, have been fitted with a flint-lock (Pl. 98); some have been taken a step further and have been converted to percussion, signifying a period of use extending to nearly two hundred years. In the Duke of Sutherland's Collection at Blair Castle, Scotland, is a seventeenth-century wheel-lock rifle which has not only been converted to a flint-lock in *c.* 1820, but has been fitted with an extension butt so that it can be fired from the shoulder. The rifle must have been well thought of to have merited these attentions.

But by the middle of the eighteenth century the flint-lock rifle predominated. In northern and central Europe it had a heavy octagonal barrel between 2 and 3 ft. long and of large calibre, between ·6 in. and ·75 in. This was set in a full stock, the butt being carved with a cavity or box for accessories and shaped with a cheek rest. The guard was extended behind the set-trigger mechanism to form a pistol-grip (Pl. 97). These rifles were accurate up to 200 yd. and their heavy bullets could stop a large animal in its tracks. It was with the aid of these rifles that the princely hunts degenerated into sickening spectacles of wholesale slaughter, achieved with the least possible inconvenience or danger to the sportsman.

Court Hunts

All the royal families of Europe had their great hunting lodges, many, like Nymphenburg near Munich and Hubertusburg near Dresden, of the size and architectural quality of a palace.[87] These formed the bases from which their owners organized their lavish show hunts in honour of distinguished guests or to celebrate some festival. Each prince endeavoured to outrival his neighbour in the number and variety of animals killed and in the magnificence of the spectacle. Vast areas of the forests were fenced off and animals driven into an arena to be killed at leisure by huntsmen in decorated pavilions. Stands were erected for spectators, and the scenes were proudly recorded in paintings and books as mementoes of the occasion. The court hunts held near Vienna to celebrate the wedding of the Emperor Leopold I and Margarita of Spain in 1666 were commemorated by a set of six etchings by Melchior Küssell (1622–83). The great stag hunt arranged in honour of the meeting between Napoleon I and the Czar Alexander near Weimar was described and illustrated in *Beschreibung der Feierlichkeiten*, published in the same year. H. F. von Fleming's *Teutsche Jäger* of 1749, gave full advice on the best procedures.

Sportsmanship seems to have been singularly lacking on these occasions. In September 1737 a bear hunt was organized for the amusement of King Frederick I of Sweden. A tract of country 27,690 paces in width was systematically beaten and the bears driven towards a *skărm* or protective hut where the King waited. One sturdy bear refused to be treated in this way and resisted all

attempts to be brought within range of the King's rifle. The latter's displeasure was great and the chief huntsman was severely reprimanded. One of his assistants, with great courage, then succeeded in capturing the bear alive. Bound to a sledge it was brought to the courtyard of the King's hunting lodge where it was released and shot by the monarch at point-blank range. Thus was honour satisfied.[88]

Another aberration of the sportsman's mind was the *Hirsch Wasser Jagd*, the water hunt where deer were driven into lakes or rivers in which boats fitted as shooting stands were conveniently placed. Ridinger's engraving, *Die Wasser Jagd*, shows a covered shooting stand erected across two boats moored in a stream. Deer are being forced to swim past at close range to huntsmen blazing away with their rifles and guns. The most extravagant examples of this form of hunt took place on the shores of the Staremberg Lake near Munich in *c.* 1730–60. Here a great state barge, an exact copy of the famous *Bucentaur* of Venice, propelled by one hundred and ten oarsmen, took its royal shooters and spectators to the place where deer were being forced into the water. The deer were either killed as they swam or were pulled exhausted into the boat to be butchered in any way fancied by the court.

Another bizarre spectacle was the festival hunt (*Festenjagd*) which was organized near Leonberg in 1748 to celebrate the nuptials of Duke Karl of Würtemberg with Elisabeth, Countess of Brandenburg-Bayreuth. A water colour in the Deutsches Jagdmuseum, Munich (No. 5802), shows an artificial rectangular lake built in the forest. On one side a wall of triumphal gates formed the entrance through which the herds of terrified deer were driven. On the other side of the lake a series of terraces and stairways hedged in with ornamental arches led up the hill to apparent safety, but there was no escape. As the bewildered animals swam or dashed up and down the terraces they were fired on by the hunters ensconced comfortably in a central pavilion.

Of course not all hunts were conducted in this fashion and in most parts the huntsman still pitted his skill and sometimes his life against that of his quarry. Some of the most difficult and dangerous of hunts were conducted in the mountainous areas of the Austrian Tyrol, Switzerland, and Italy in the search for

chamois. Since the grand days of Maximilian I these agile creatures had retreated deep into the more inaccessible parts of the mountains and they were difficult to find and to shoot. If the hunter missed with his first shot he did not have time to reload, so a reserve shot was essential. Two types of guns for chamois hunting (*Gemsjägerflinte*) were developed. One was a double-barrelled smoothbore carbine loaded with two or three bullets in each barrel; the other was a single-barrelled rifle with

110. The famous Swiss chamois hunter Johann Heitz. Note the spiked butt of the rifle and the crampons on his feet. From Reichard's *Malerische Reise durch eine grossen Teil der Schweitz* (1805).

two superimposed charges and two locks (Pl. 90). The latter gun had the advantage of being lighter in weight. A characteristic feature of these guns was a spike protruding from the heel of the butt which was rested on top of the shoulder during shooting and to some extent helped the gun to be used as an alpenstock during climbing (Fig. 110).

American Rifles

German and Swiss sportsmen emigrating to America early in the eighteenth century took their rifles with them and helped to introduce the technique of their manufacture and use to the New World. It was not long before local conditions forced the development of a different kind of rifle. The octagonal barrel was lengthened to between 3 and 4 ft., sometimes longer, to give the coarse powder time to burn and to increase accuracy. To keep the weight down to manageable limits the calibre was reduced to between ·45 in. and ·60 in., and by the end of the century to between ·40 in. and ·45 in. The straight, thick butt gave way to a slender design with a down-drooping curve and a humped-back comb for a cheek rest. The trigger-guard with its extensive grip was retained and the butt box given a distinctive brass-inlaid surround. A full stock completed a graceful but deadly firearm (Pl. 100). The reduction of the calibre enabled the hunter to carry a larger number of bullets per lb. of lead.[89] For the same reason a flask of gunpowder lasted longer; an important consideration for hunters miles from civilization.

The long American rifles, made mainly in Lancaster and Bucks County, Pennsylvania, and in the neighbouring states of Virginia and New York, appear to have been more accurate than their European predecessors. During the American War of Independence, stories of men being struck at ranges of 400 yd. were not uncommon, but conditions had to be ideal for this standard of shooting. To test the veracity of these stories of long-range shooting John Dillon, in 1924, organized the trials of three Kentucky rifles; the first with spiral grooves, the second with straight grooves, and the third with its barrel bored out smooth. Ten shots were fired with each rifle at ranges of 100, 200, and 300 yd. at a silhouette target of a man. The results clearly established the superiority of the normally-rifled gun and gave an indication of its accuracy at long range.

Range		*No. of hits*
100 yards	Spirally grooved	10
	straight grooved	10
	smooth bored	10
200 yards	spirally grooved	10
	straight grooved	5
	smooth bored	4
300 yards	spirally grooved	5
	straight grooved	2
	smooth bored	1

Further tests showed that the small-calibre bullets were capable of penetrating $2\frac{1}{2}$ in. of chestnut at a distance of 50 ft., and $\frac{3}{4}$ in. of chestnut at 300 yd., carrying sufficient shock power to kill small or medium-size game at the longer distances.[90]

Before the Revolution, game in America was both varied and abundant. Some of the driving tactics used in Europe were tried in the southern states of America. In the vicinity of Pomfret Castle about the year 1760 an area of land was cleared and this formed the centre of a circle some miles in diameter. Into this were gradually herded a yelping, growling, bellowing mass of animals. A group of buffalo which crashed through the circle of guards allowed some hundreds of beasts to escape but when the killing of the remainder was finished the following 'score' was recorded: 41 panthers, 109 wolves, 112 foxes, 114 mountain cats, 17 black bears, 1 white bear, 2 elk, 198 deer, 111 buffalo, 3 fishers, 1 otter, 12 gluttons, 3 beavers, and nearly 500 smaller game.[91] Such occurrences, however, were rare. The favourite sport of the scattered communities was the turkey shoot in which the turkey was buried in the ground or hidden by a log until only its live head was left as a target.

English Rifles

In eighteenth-century Britain, with the destruction of forests and the enclosure of waste lands, the herds of wild deer were banished to the barren moors of Devon and Scotland, and the opportunities for using a rifle began to dwindle rapidly. When a demand for rifles arose during the American Wars, the British Board of Ordnance was hard put to find gunmakers in England capable of producing rifled barrels in any quantity. The success of the Ferguson rifle in that conflict brought a demand for sporting versions of this breechloader and some fine silver-mounted specimens were made by such makers as Durs Egg and Henry

Nock. Nock, who manufactured the famous seven-barrelled volley guns for the Navy in 1780,[92] also received follow-up orders for seven-barrelled sporting guns and rifles. The leading exponent of the multi-barrelled gun which fired all its shots in a volley was Colonel Thomas Thornton (1757–1823). To use his own words he had 'a greater quantity of sporting apparatus of the most valuable and curious manufacture than any other sporting gentleman in England'. He had an obsession for delivering a large number of heavy balls with one shot. He loaded his seven-barrelled guns with three balls per barrel; his portrait by Philip Reinagle and Sawrey Gilpin in 1796, shows him shooting roebuck in the forest of Glenmore with a twelve-barrelled rifle (Fig. 111); and in the Musée d'Armes, Liège (No. Ae 1), is his fourteen-barrelled gun composed of two clusters of seven barrels.[93]

Although there was little game in Britain to encourage the development and design of rifles the enthusiasms of the volunteer movement which flourished during the Napoleonic Wars resulted in an upsurge of interest in the rifle. The adoption by the British Army in 1800 of a rifle designed by the London gunmaker Ezekiel Baker gave added zest to the new interest. Baker's rifle which had a barrel 30 in. long was rifled with seven grooves in conformity with the current belief that an odd number of grooves was preferable, seven being the most popular number. But the matter which now engaged the attention of the gunmakers and riflemen was the question of the degree of twist which should be applied to the spiral of the rifling. Baker followed the principle laid down by Benjamin Robins in 1742 that 'whatever tends to diminish the friction in rifle barrel pieces, tends at the same time to render them more complete for the service'.[94] He gave the rifling in his barrels a quarter turn only, and there is no doubt that up to 100 yd. the Baker rifle gave a good performance both in accuracy and in rate of fire. But there were opposing views on this subject. A great deal of shooting was being done at ranges up to 300 yd. and at these distances the accuracy of the Baker rifle diminished rapidly.

Henry Beaufoy in his *Scloppetaria*, published in 1808, gave convincing proof of the improved accuracy obtained by increasing the twist to a three-quarter or full turn. Whereas at 200 yd. Baker was content to put all his bullets into a man-size target, a rifle

111. The famous sportsman Colonel Thomas Thornton (1756–1823) with his twelve-barrelled rifle. From the engraving by M. N. Bate, published in 1810, after the painting by Reinagle and Gilpin executed in 1796.

with an increased twist by William Moore, recorded by Beaufoy, put 40 successive shots into an 18 in. circle at the same distance. The latter performances, however, were achieved under optimum conditions. The sportsman in the field could not clean his barrels between shots and could only guess at the distance of his target. The resistance set up by too severe a twist in the rifling could lead either to stripping or to a heavy recoil. If the sportsman reduced his charge of powder to prevent this he lessened the stopping power of his bullet. In any case the ball which holed a bulls-eye neatly at 200 or 300 yd. did not necessarily have any useful velocity left. The problem was to remain a bone of contention between British sportsmen in the colonies needing power at close range, more often than not, and the gunmakers at home intent on giving them long range accuracy at all costs. For hunters in South Africa, often needing to call on either a shotgun or a rifle, gunmakers did make a fairly successful compromise by providing a gun with a long barrel rifled with straight grooves which discharged shot or ball with reasonable success (Pl. 92). These Cape rifles are usually distinguishable by their rather archaic appearance with a full-length stock and deep-bellied butt copying the early Dutch settlers' guns.

Bullets and Rifling

The great divergence of opinion which had always existed concerning the ideal form of rifling is well brought out by the analysis, published by Hans Busk in 1860, of the collection of rifles in the Musée d'Artillerie (now Musée de l'Armée) at Paris.

> Three hundred and eleven of them are ·68 in. and under, in the bore, 32 are larger than ·68. Thirty-two have barrels not exceeding 19·50 inches in length. Two hundred and sixty-seven are between 19·50 and 39 inches long. Nineteen have straight grooves; 321 have inclined grooves; 131 have the grooves uniformly inclined. In 81, the twist diminishes from the breech to the muzzle; in 29 it increases in the same direction; while in no less than 83, the twist increases about the middle of the bore.
>
> In 67, the grooves make (like the Enfield) one half-turn, or less, from breech to muzzle. In 219, the grooves make from one half to a whole turn. In fifty-five, from 1 to 2 entire turns. Two hundred and twenty-six have an even number of grooves, 117 an odd number. Seventy-nine have from 2 to 6 grooves, 232 have from 7 to 12 grooves.

Two hundred and seventy-five have grooves with rounded edges. Thirty-three have triangular grooves, 9 have rectangular grooves, and 26 have grooves not clearly defined.

Two hundred and ninety-six, have grooves ·11 in. and less in width. In 47 others, the grooves are wider than ·11 in. One hundred and fifty-three, have grooves ·0197 in. wide or less. One hundred and seventy-nine from ·0197 in. to ·0394 in., wide, and in 14, the grooves are more than ·0394 in. wide.[95]

Busk commented on the fact that there was no example of rifling with grooves which decreased in depth or which was of elliptical or oval bore.

The latter type of rifling was dismissed by Beaufoy in his book as 'a very old invention, though quite obsolete in our time'. The first part of the statement was certainly correct. A flint-lock sporting rifle of *c.* 1700 by Martin Peltier of Rheims in the Tower of London Armouries (No. XII–1016), has two-groove rifling worn or smoothed off into an oval section. In the same collection is a rifle of *c.* 1770 by I. Girarde of Porrentry with a distinct oval bore. The Russian Johan Georg Leutmann had advocated this form of rifling in 1735.[96] Not long after Beaufoy so roundly rejected the oval bore European gunmakers began to experiment once again with this form of riflling. Between 1834–6 the armies of Hanover, Brunswick, and Great Britain adopted oval-bored or two-grooved rifles. A belted ball was often used to assist loading and to prevent stripping under the strain of a full turn in the rifling.

Although the Brunswick rifle, as used by the British, was to be condemned later as an 'abortion' its type of rifling had its fervent supporters in sporting circles at the time. Sir Samuel White Baker, the hunter and author, had five two-grooved rifles in his armoury of weapons.[97] Some of the peculiarities of the weapon are indicated by the performances of the largest of these rifles which was made in 1840 by Gibbs of Bristol and weighed 21 lb. It fired either a 3 oz. belted ball or a 4 oz. conical bullet with a charge of 16 drams of powder. The conical bullet with a charge roughly a third of its weight had amazing penetrative powers but it often failed to stop a large animal. With the belted ball, however, the rifle could be relied upon to bring down anything on four legs, and twice killed two buffaloes with a single shot.

The adoption of the belted ball by several European forces and numerous sportsmen during the second quarter of the nineteenth century turned gunmakers' attentions towards the idea of changing the shape of the bullet which had remained unaltered for five hundred years. Experiments had, of course, been made before. One of the numerous drawings of *c.* 1505–10 left by Leonardo da Vinci appears to be that of a cylindrical bullet with a pointed nose and hollowed-out base.[98] Isaac Newton in his *Principia* of 1687, indicated a cylindro-conoidal form as the shape giving less resistance when passing through a fluid. Robins in his *Principles* of 1742 recommended an ovoidal or egg-shaped bullet, with the centre of gravity near the front, as the one most likely to follow accurately the line of a desired trajectory. Gunmakers, on occasion, had indulged in barrels for sporting guns of trefoil, cinquefoil, or heart-shaped section.[99]

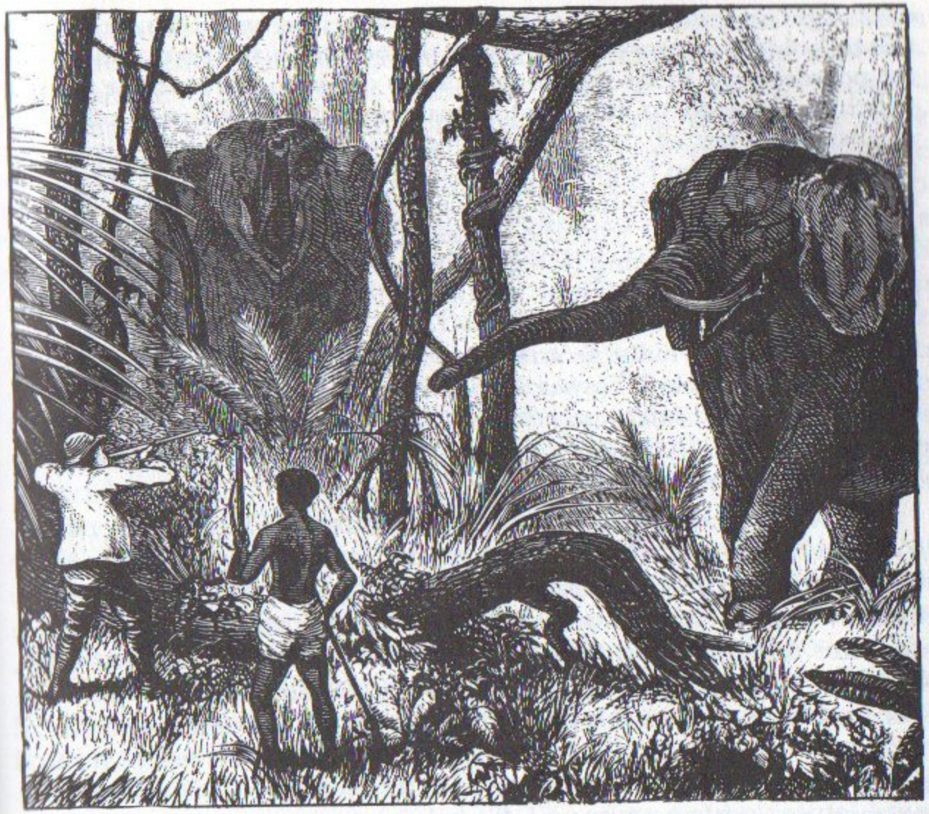
The British officer, Captain John Norton, produced, in 1823, an elongated projectile, about four in. long, intended for the musket. The lower part contained the charge which expanded the base to fit the bore tightly and the point was armed with an explosive head. The difficulty was to make it strike point foremost. Norton, it is said, got the idea from the blow tube used by the natives of southern India which discharged an arrow with an expanding lotus-pith base.[100] The search for a more efficient form of bullet now became confused with the military's desire for a bullet which could be easily loaded into a rifled barrel and yet be expanded to fit it tightly on discharge, thus combining the speed of a musket with the accuracy of a rifle. In the breeches designed by Captain Gustav Delvigne (1826) and Colonel Louis Thouvenin (1840) the ball was pushed down the barrel and expanded by being hammered on the shoulders of a chamber or on the end of a pillar or *tige*. In the Greener egg-shaped bullet of 1836 and the cylindro-conoidal bullet of Captain Claude Minié, patented in 1849, the expansion was achieved by some form of plug being driven into the base of the bullet. The Minié won recognition during the Crimean War, but few sporting rifles were made for its use. It was superseded by the hollow-base bullets of Delvigne and James Burton of Harper's Ferry Armoury, U.S.A. The experiments continued in the search for greater long-range accuracy; the bullets were lengthened and the calibres gradually reduced. General John Jacob, after years of trials in India, designed a double-barrelled rifle capable of firing a studded, conical

bullet up to 2,000 yd. This winged, sugar-loaf projectile was well thought of in the sporting world, Purdey of London adapting the design to a very effective rifle which he marketed with success. The oval bore was revived by N. S. Jessen in Denmark and Charles Lancaster in England.

A hexagonal form of barrel and bullet, scientifically thought out by the engineer Joseph Whitworth, made a great impression on the target-shooting community. It soon out-shot the British Government model Enfield at ranges in excess of 1000 yd. At 500 yd. it could group its bullets in a 12 in. circle. All these capabilities were of advantage to the soldier and the marksman. But the sharp twist—one turn in 20 in. in the case of the Whitworth—produced a high trajectory so that the ball rose several inches above the line of sight at 100 yd. As many sportsmen were quick to observe, they rarely shot over 150 yd.,[101] and that even when firing at a large animal they needed to hit a vital spot for a knock-down blow (Fig. 112). Often unable to gauge the range exactly, a deviation of inches due to a high trajectory might be critical. Lieutenant James Forsyth in *The Sporting Rifle* (1863), made the point that the hunter's real need was for a long point-blank range. If he was satisfied with a 150–200 yd. maximum range then he recommended a 14-gauge barrel rifled with shallow broad grooves making a twist of one turn in 12 ft. He gave the following table to prove his point that the rifle with the longest range did not have the longest point-blank range. At the same time he emphasised the advantages of retaining the old-fashioned spherical bullet.

Type of Bullet	*Gauge*	*Twist 1 Turn in*		*Charge*	*Point Blank Range*	*Extreme Accurate Range*
		ft.	in.	drs.	yd.	yd.
Whitworth, Henry or other small bore	50	1 to 2	8 to 6	$2\frac{1}{2}$ to 3	30 to 40	1200
Jacob's picket	32	2	6	$2\frac{1}{2}$	35	1000
Purdey's 2-groove winged ball	32	6	0	3	60	350
Enfield hollow cone	24	6	6	$2\frac{1}{2}$	40	500
Plain Ball	14	8	8	$3\frac{1}{2}$	70	250
,, ,,	14	12	0	5	95	200[102]

In the face of all the scientific trials which had taken place such



112. Elephant shooting in the African forest. The hunter waits for a close shot. From *Sport in Many Lands* (1877).

a recommendation seemed a retrograde step. But Forsyth reminded his readers that the native hunters of India, armed with a long, smoothbore match-lock gun and firing at close range, generally killed whatever they fired at with a single shot, whereas many European sportsmen using the best rifles available were not so successful.

For similar reasons mounted buffalo hunters in North America in the 1850s often preferred smoothbore guns to rifles. The traveller Rudolf Kurz gave this account:

on buffalo hunts they [the hunters] do not carry rifles, for the reason that they think the care required in loading them takes too much time unnecessarily when shooting at close range and, furthermore, they find rifle balls too small. The hunter chases buffaloes at full gallop,

discharges his gun, and reloads without slackening speed. To accomplish this he holds his weapon close within the bend of his left arm and, taking the powder horn in his right hand, draws out with his teeth the stopper which is fastened to the horn to prevent its being lost, shakes the requisite amount of powder into his left palm, and again closes the powder horn. Then he grasps the gun with his right hand, holding it in a vertical position, pours the powder down the barrel, and gives the gun a sidelong thrust with the left hand, in order to shake the powder well through the priming hole into the touchpan. Hunters at this place [Fort Union near the mouth of the Yellowstone] discard percussion caps as not practical.

Now he takes a bullet from his mouth and with his left hand puts it into the barrel where, having been moistened by spittle, it adheres to the powder. . . . Hunters approach the buffalo so closely that they do not take aim but, lifting the gun lightly with both hands, point in the direction of the animal's heart and fire.[103]

In the first half of the nineteenth century whilst the percussion lock was ousting the flint-lock and the barrel and bullet were being redesigned, the stock and fittings of the sporting rifle underwent much the same simplification as those of the shotgun and the decoration was reduced to the minimum. In America, however, there were some interesting developments. The long Pennsylvanian rifle with its small bore had remained the standard rifle of the inhabitants of the eastern coast states who hunted small game in wooded country usually on foot. As the West was opened to settlers, hunters found it necessary to travel long distances on horseback and were often confronted with large game such as buffalo and the grizzly bear. The long barrel which was an impediment on horseback was shortened to between 28 in. and 38 in. and the calibre increased to an average of from ·50 in. to ·55 in. At the same time the barrel was strengthened to take a heavier charge, and the stock, usually a short half-length stock, made stronger. These alterations brought the weight up to 12–15 lb. Known contemporarily as 'mountain rifles' or 'Hawkins rifles' (a corruption of the name of the Hawken brothers of St. Louis who were famous makers), they are known today as 'plains rifles' (Pl. 102).[5]

Breechloading Rifles

The long rifles and the short rifles were converted to percussion and remained popular up to *c.* 1860. By this date the

breechloader was quickly gaining ground. Magazine repeaters like the Henry, the Winchester, and the Spencer fired a pistol-size bullet. These rifles could be fired at amazing speed—Winchester claimed a rate of two shots per second for their Model 1876—but the calibre and weight of the bullets were mainly suitable for light game. For the pursuit of the buffalo heavier rifles with powerful single-shot actions like the Sharps were preferred (Pl. 127). The Sharps first became popular when paper or linen cartridges were still in use in conjunction with a separate percussion cap. After the American Civil War, the Sharps, in common with other firms' guns, was converted to take various sizes of metallic cartridge. These were made in calibres ranging from ·40–·50 in. A typical Buffalo-model Sharps weighed 16 lb. and had a 32 in. barrel chambered to take a long cartridge with a 120 grain powder load and a 550 grain bullet of ·45 in. calibre (hence its designation 45–120–550).

Other powerful rifles capable of delivering a heavy bullet at long ranges were the Ballard, the Stevens, and the Winchester single-shot. The most famous of the professional buffalo hunters, William Cody or Buffalo Bill, used a Springfield rifle to win the Buffalo Shooting Championship of the World in 1867. General Custer was one of those who liked the Remington single-shot rifle with a rolling-block action. In 1873 he informed the makers that with their ·50 calibre model he had been successfully killing antelope at ranges up to 630 yd.[105] The effect on the animal kingdom by the introduction of these powerful new rifles was devastating. The buffalo, one of the most prolific of the large animals, was attacked as well with every form of firearm—pistol, smooth-bore gun, single-shot, and repeating rifles (Fig. 113)—until it was nearly exterminated. In 1868 William Blackmore made a railroad journey across the plains between Ellsworth and Sheridan and was able to report the sighting of a continuous herd of buffalo 120 miles long. During the next decade, buffalo shooting became a big business and between 1872–4 it has been estimated that 4,373,730 buffalo were killed. By 1884 not a single herd of a hundred had survived.[106]

In Europe in the 1860s the breechloading rifle was making similar progress. That staunch advocate of the spherical bullet, James Forsyth, ended his book *The Sporting Rifle* in 1863 with a postscript recommending the Lockfast system of breechloaders,

still insisting that the round ball was suitable. Many colonial sportsmen agreed with Forsyth. As late as 1883, in the second edition of *The Large and Small Game of Bengal and the North-Western Provinces of India* (p. 374), Captain J. H. Baldwin was still advocating a breechloader using Forsyth's rifling and

113. Clearing the track. Passengers and crew on an American train surrounded by a herd of buffalo open fire with revolvers, guns and repeating rifles. From Dodge's *Hunting Grounds of the Great West* (1877).

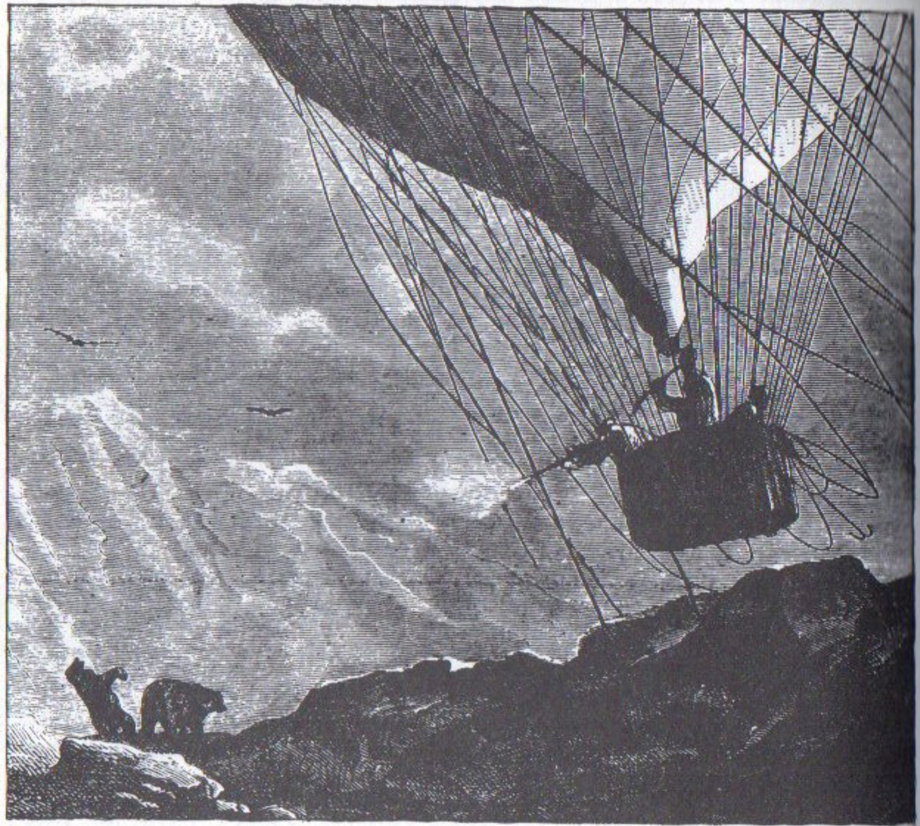
spherical bullet. In England one of the most enthusiastic of hunters was Prince Albert. In the Royal Collection at Windsor are many of his rifles, a varied collection from short, muzzle-loading carriage-rifles to powerful, early-cartridge rifles. On the butts of some he has recorded his kills for the year in silver dots (Pl. 118). He introduced many continental customs and outraged some conservative sportsmen by shooting in a black velvet

jacket with long boots of scarlet leather. But he was well versed in technical matters. He followed the Enfield *v.* Whitworth trials closely and in 1861 he wrote to Lord Balmoral to recommend the merits of the Westley Richards cavalry carbine: 'we have tried it here after deer and found it very good. I have been shooting this year exclusively with Lancaster's breechloaders (a gift from the Queen) and found the advantages in a hundred ways so great over the muzzleloading rifles that I shall abandon these . . .'[107]

At this period European gunmakers, in common with their American counterparts, were utilizing the metallic cartridge to increase the power of the load, boring out the chamber to a larger size than the barrel. Strong single-shot breeches with some form of lever-operated moving-block action like those of John Farquharson, Alexander Henry, and Westley Richards (Pls. 132–4) were developed in the 1860s and 1870s to handle the powerful long sporting cartridges then being marketed by the ammunition makers. As early as 1856 the London maker, Purdey, had likened his latest high-powered rifle to an express train and the term 'express rifle' became adopted for all high velocity rifles. In the 1883 *Field* trials held at Putney near London, over a range of 150 yd., the winning double rifle of ·45 calibre, by Holland & Holland, had an average deviation of only 1·45 in. At the heighth of its trajectory the bullet rose only 4·68 in. The smokeless powders introduced in the 1890s enabled the gunmakers to increase the velocities of the rifles even more. It was soon possible to supply a deer rifle of ·303 calibre which needed only one sight for ranges up to 300 yd., so flat was its trajectory. The smaller rook and rabbit rifles could put all their shots on a half-a-crown at 50 yd. At these velocities there was no question of deep rifling or studded bullets. The cylindro-conical bullet with an alloy covering, shot from shallow grooves, was almost universal ammunition.

But there was still a demand for a gun capable of delivering a large bullet at short range with great impact. A ·600 Nitro-Express did this but the rifle was a heavy one and not to everyone's taste. In 1885 G. V. Fosbery took out an English patent (No. 7565) for a system of rifling the choked muzzle portion of a smoothbore shotgun barrel. Marketed under such names as the Paradox, the Colindian, and the Cosmos, these barrels enabled the hunter to shoot either shot or a large bullet at will from the

same barrel. The Paradox ball and shot gun was made in the popular sizes from 10–20 bores and provided a light, dual weapon which looked like an ordinary shotgun but which enabled the hunter—to use the words of an advertisement—'to take a snap



114. The American balloonists Fergus and Thompson shooting bears. The magazine *La Chasse Illustrée* (1868) from which this engraving is taken commented: 'Rien n'est plus excentrique qu'un Américain, si ce n'est . . . deux Américains.'

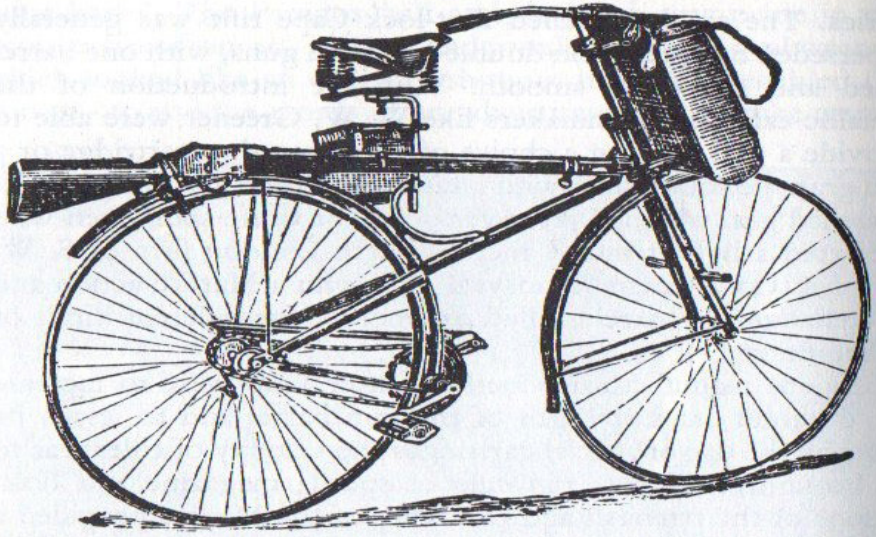
shot at a tiger with much the same confidence and facility with which one would shoot at a bolting rabbit'. But although Holland & Holland made a nitro model of this combination gun with a range up to 300 yd., the Paradox ball was not normally fired above 150 yd.

The double-purpose gun had always been popular in South

Africa. The single-barrelled flint-lock Cape rifle was generally superseded by percussion double-barrelled guns, with one barrel rifled and the other smooth. With the introduction of the metallic cartridge, gunmakers like W. W. Greener were able to provide a gun offering a choice of a 12-bore shot cartridge or a 480 gramme solid bullet with a range up to 700 yd. This double-barrelled gun weighed just over 9 lb. For those sportsmen who preferred a lighter model there was the London firm of S. W. Silver & Co.'s patent 'Transvaal' gun with a Martini action and interchangeable barrels, rifled or smooth, for different kinds of ammunition.

Modern manufacturing methods after 1900 were to increase the durability and strength of the gun barrel and to lessen its cost; by the use of special cartridges the velocity of rifles was to be brought to a new pinnacle of speed; magazine and bolt-actions of the strength and reliability of the Mauser provided a safe repeating action (Pl. 138); telescopic sights were to make the hunter's task a matter of calm deliberation at a safe distance from the target, but to all intents and purposes the sporting rifle had reached its zenith of development by the end of the nineteenth century. There can be no more telling comment on the deadliness of the firearm as a hunting weapon than the official list of game shot in Austria in 1892:

Red-deer	12,385	Capercaillie cock	5,143
Fallow-deer	2,788	Blackcocks	9,458
Roe-deer	68,110	Hazel-grouse	10,851
Chamois	8,144	Ptarmigans	2,075
Wild boar	3,509	Stone grouse	3,259
Hares	1,309,688	Pheasants	141,264
Rabbits	95,803	Partridges	1,036,836
Marmots	647	Quail	94,995
Bears	33	Woodcocks	26,057
Wolves	69	Snipe	14,756
Lynx	31	Wild geese	1,245
Foxes	26,553	Wild ducks	52,440
Martins	11,281	Eagles	510
Fitchet and Polecats	30,668	Falcons, buzzards, hawks	101,960
Badgers	3,870	Owls, etc.	30,855[108]
Fish otters	1,267		



115. From Messrs. Hillman, Herbert & Cooper's advertisement in the magazine *Sport und Jagd Zeitung* (1889) of their 'Military or Hunting Safety-bicycle'.

Long Guns

Throughout the history of firearms the big gun has always exercised a fascination amongst shooters. Sometimes it was a case of having something bigger and better than one's neighbour, the attraction and prestige of a giant toy to be discharged to the wonderment of all. But in the early days of gunnery there was a genuine belief that the longest range was achieved by the longest gun, and to some extent under the conditions then prevailing this surmise was correct; and there was no denying that the bigger the bore the bigger the charge and the number of shot. Before the days when hunters shot at flying birds the sight of a great flock of birds feeding on the ground, always keeping just out of range of the ordinary gun, was enough to goad most sportsmen into the purchase of a gun which could reach such a tantalizing target.

Some, even, may have been tempted to use the 'cart guns' which were introduced in the fifteenth century as a form of light artillery. They were breechloaders firing shot of approximately 1 lb. and mounted singly or in pairs on two-wheeled covered carts. On 19 October 1456 a Scottish Act required 'certain of the great barons of the lands that are of any might to make carts of

war; and in each cart two guns; and each one of them to bear two chambers, with the remainder of the equipment that appertains thereto; and one knowledgeable man to shoot them.' Many of these carts were used by Henry VIII at the siege of Boulogne in 1544. Illustrations of them can be seen in F. Grose's *Military Antiquities* (London, 1788), Vol. II, pp. 330–1. It was the sort of thing which could easily get out of hand and, as early as 1514, a Flemish broadsheet forbade people to use a 'couleuverine' to kill red and black game (deer and wild boar), hares, rabbits, partridges, pheasants, herons, and other wild fowl.[109] The word culverin was later used to describe a long cannon but the guns referred to in this context were probably more of the size of wall guns (see also p. 292).

At the beginning of the seventeenth century the first long fowlers appeared. One of the earliest specimens, preserved at the Curtis Museum, Alton, Hants., has a total length of 6 ft. 4 in. and the 5 ft. barrel has a calibre of just over ½ in. or approximately 24 bore. This fully-stocked gun has an 'English' type of flintlock with a dog-catch which dates it to *c.* 1620–40. It was a gun which could fire almost anything—small shot, a number of small bullets, or a single ball—to distances of 100–200 yd. It had to be rested on some kind of support during firing and it was easily turned into a military arm for the defence of or attack on fortified positions.[110] At the time of the Siege of Basing House the *City Scout* news-sheet of 11 October 1644 wrote:

Lieut-General Cromwell goes on hopefully and truly against Basing and they within as resolute to stand out to the last man. They are notable marksmen and with their long pieces can take a man a half-head as one would a sparrow.

In 1621 Edward Winslow of Plymouth, Massachusetts, wrote home to prospective Pilgrim emigrants advising them on the equipment needed in the New World. On guns he commented: 'Let your piece be long in the barrell and fear not the weight of it, for most of our shooting is from stands.' One of the colonists, John Thompson, brought to America the next year a gun approximately 7 ft. long. His gun and another similar belonging to John Forbes who settled in East Hartford, Connecticut, in 1640, are still preserved. An area which saw a number of these long fowlers in use was the Hudson Valley of New York where

there were heavy migrations of geese and ducks each year.[111] In England the extreme lengths to which some sportsmen would go is shown by the definition of a fowling piece given by Randle Holme in his *Academy of Armory* of 1688:

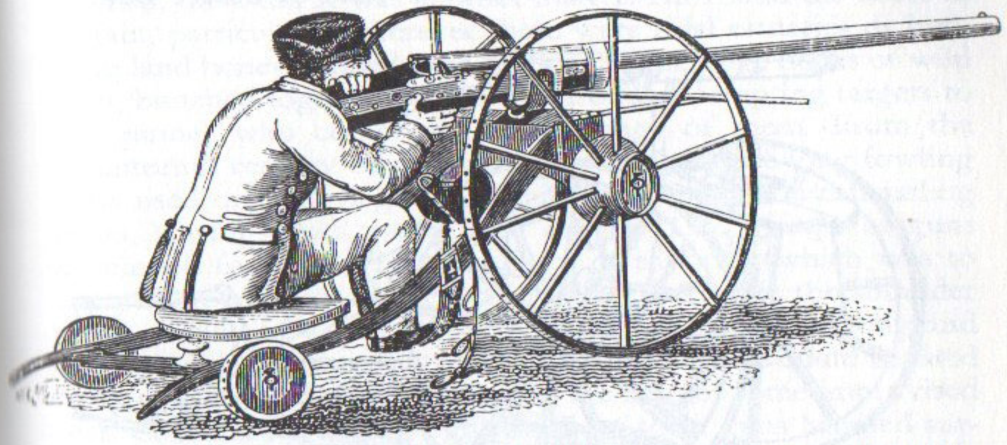
> A Fowling peece, is of severall lengths in the barrell from a yard and quarter, to 7 foot, or two yards and a halfe long. The bore is generally in these guns lest than a calever bore.[112]

A gun over 8 ft. in length (Pl. 93) raised transportation problems and as the game became scarcer in the neighbourhood of towns it became necessary to devise some form of vehicle to carry the guns. Some were carried in low carts suitably camouflaged. In H. F. von Fleming's *Der Vollkommene Teutscher Jäger*, published in Leipzig in 1724, appears an illustration of a giant match-lock duck-gun on a two-wheeled carriage and trail, appropriately named *Karren Büchse* (cart gun). In the eighteenth century the wall gun or rampart gun became a recognized military arm. Marshal Saxe in *Mes Rêveries*, of 1757, advocated a gun of this kind which he called an 'amusette'.[113] In 1761, the *Annual Register* reported one of these firing a ½ lb. ball to a range of 800 yd. during a trial in Dublin. In rifled form the wall gun was much used by both sides in the American War of Independence. General Charles Lee testified to the effectiveness of these weapons when he wrote to George Washington on 10 May 1776: 'I am likewise furnishing myself with four-ounced rifle-amusettes, which will carry an infernal distance; the two-ounced hit a half-sheet of paper 500 yards distant.'[114]

For those hunters who wished to attack large game from a safe distance or blow a hole through a cloud of birds the necessary guns were thus available. Most of the great princely armouries of Europe included in their hunting sections some giant wheeled gun or rifle. One of the most bizarre pieces was the giant airgun resembling a small field gun which Joseph Gallermayer made for Duke Maximilian III, in 1763, for his hunting lodge at Nymphenburg, near Munich. In 1804, George IV, then Prince of Wales, bought a large seven-barrelled gun from Ezekiel Baker, the London gunmaker, for £31 10*s*. It was a large version of the seven-barrelled goose guns which had become popular after the introduction of similar guns into the Royal Navy in 1779. It is not clear whether the Prince intended

it to repel all invaders from his London home, Carlton House, or whether he proposed to annihilate the deer in Windsor Great Park. In 1808 it was mounted on a stand and it is now in Windsor Castle.[115]

One of the greatest exponents of big guns was Colonel Peter Hawker. In his *Instructions to Young Sportsmen* (9th Edit., 1844), he devotes a chapter to 'Wildfowl Artillery'. One of his contrivances was a wheeled carriage for a staunchion gun with a seat on which



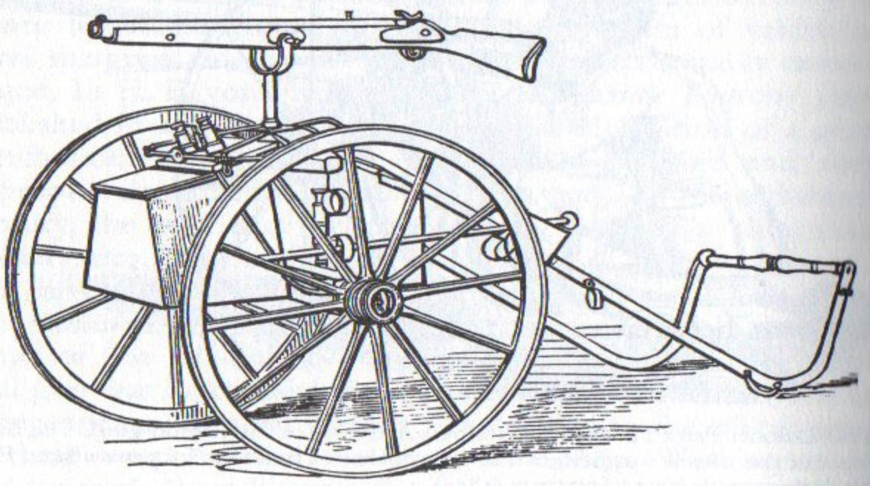
116. Colonel Peter Hawker's 'Wildfowl Artillery' or 'Stanchion-gun'. The bar in front of the wheels was designed to take bushes or branches for camouflage. From his *Instructions to Young Sportsmen* (1844).

the gunner was obliged to sit, 'so as to go back with it' on recoil, so great was the force of the charge (Fig. 116). The horizontal bar in front of the wheels was a splinter bar to carry a hurdle or bushes to mask the gunner's approach. For what Hawker called an 'invisible approach' he designed a machine looking like a punt on wheels in which the gunner lay with a hinged cover on top to hide him. Hawker's drawing of the contraption disguised with sacking and shrubbery is most impressive. But someone had to push the cart with its heavy load into position, and, as Hawker himself remarked: 'Let me see the man who will invent anything to work a *staunchion*-gun over *bad* ground.'

By virtue of their great weight and the difficulties of transporting them there are few reports of the use of these big guns. John Atkinson, however, in his *Foreign Field Sports* (London,

1814), describes an elephant hunt, in which the hunter used a 'large fusee on its pivot' weighing 30 lb. This killed an elephant first shot when fired into the middle of its forehead. Another elephant, not so fortunate, had sixteen shots fired into it until 'its excrements were tinged with blood', but it escaped.

H. A. Leveson, 'the old Shekarry', who probably had as much experience as anyone of overseas conditions, designed a similar carriage to that of Hawker's for service in central Africa, but the gun it held was not for fowl but for 'man or beast'. Built by



117. 'The Whisperer.' A carriage rifle built by Henry Holland for 'The Old Shekarry' (H. A. Leveson) for service in Central Africa. It fired a cylindro-conical bullet weighing half a pound. From Leveson's *Wrinkles; or, Hints to Sportsmen and Travellers* (1874).

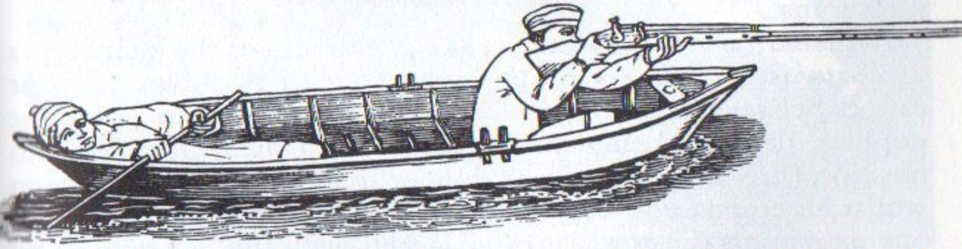
Henry Holland it was comparatively short in length but it had a charge of 12 drams of powder and fired a cylindro-conical bullet weighing ½ lb. (Fig. 117). According to Leveson it could be easily drawn over any kind of country together with a wigwam and ammunition or taken to pieces and packed on one mule. It rejoiced in the name of 'The Whisperer' or 'The Rib-Tickler', but in spite of its inventor's claims there are no accounts of any great shooting feats with it.

Perhaps the most famous of all hunters Sir Samuel White Baker took with him on his Nile Expedition a single-barrelled rifle by Holland and Holland which weighed 20 lb. and fired a

½ lb. percussion shell with a charge of 12 drams. Known to its master as 'Baby' and to his Arab servants as 'The Cannon's Child' it never failed in its effect, but unfortunately sent the user spinning backwards 'like a weathercock in a hurricane' every time that it was fired.

Punt Guns

Although the big guns suffered because of their lack of mobility on land, on water it was another matter. All round the coast of Britain, particularly wherever there were tidal estuaries or low-lying land honeycombed with muddy creeks, large flocks of wild fowl, bunched together on the water offered tempting targets to the gunner who could get within range of them. From the seventeenth century onwards wildfowlers with the long fowling guns used on land began to assail the fowl from small sailing boats, rowing boats, punts, and canoes. Two groups of guns developed for this specialized form of shooting which was to many their only means of livelihood. There were the shoulder guns, usually of 8 or 10 bore with barrels of 4–5 ft. long and weighing between 12 and 15 lb. (Fig. 118). These could be fired from the shoulder with, if need be, the help of some improvised rest. Considering their weight, some of these guns handled surprisingly well. Hawker relates how one duck gun made by Joe Manton and weighing 19 lb. was so well balanced that he killed two peewits and two swifts on the wing with it in five single shots. With another heavy duck gun he brought down a wood pigeon flying overhead 'full 120 yards high'.[116] Any boat which could negotiate shallow channels and stand up to the occasional rough sea was suitable. The great punt guns, however, with



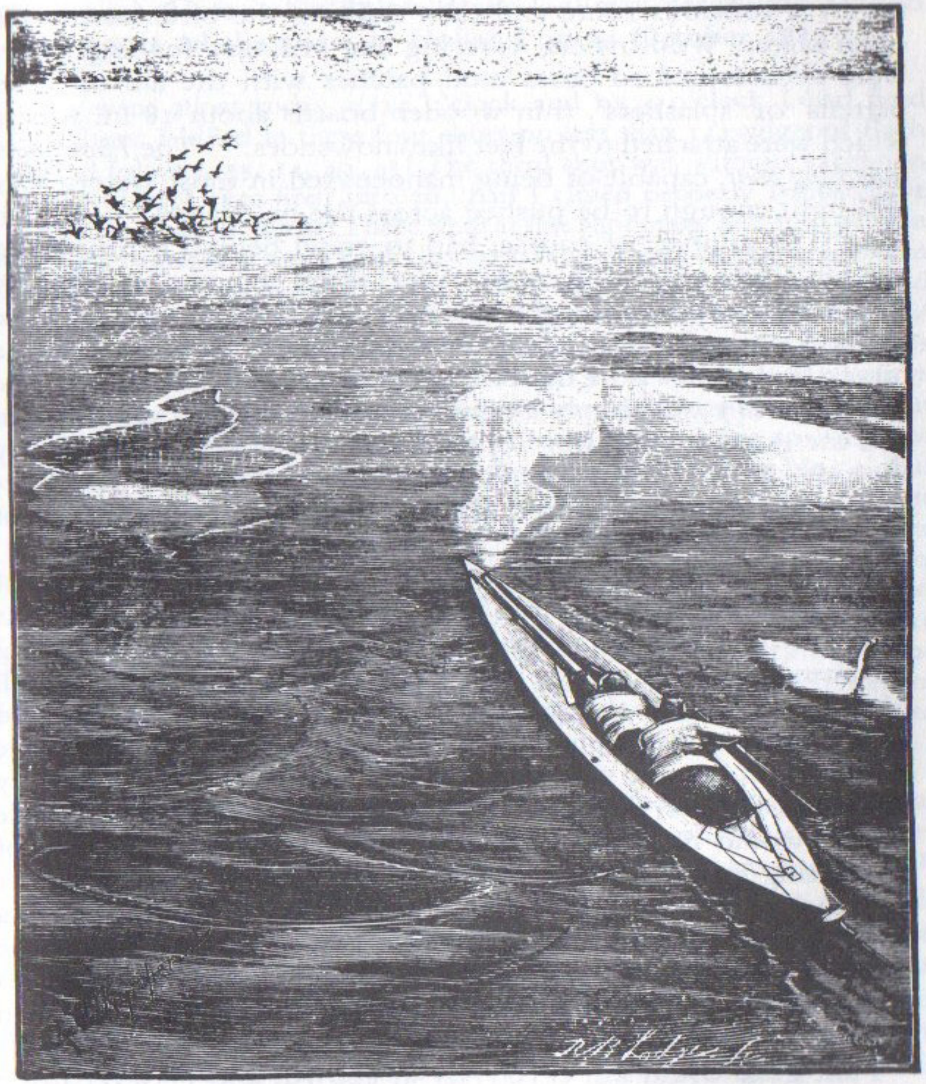
118. Wildfowlers in a Poole canoe. This was flat-bottomed, drawing only 2 in. of water and pointed at both ends. Weighing about 100 lb. it was ideal for shooting amongst creeks and mud-flats. From Hawker's *Instructions* (1844).

barrels from 7–10 ft. long and weighing anything up to 200 lb. had to be specially catered for.

The early punt guns were usually supported on a crutch set in the bow of the boat and were fired from the shoulder; the small butt being wrapped with some form of cushioning like sacking and straw. The gunner lay prone in the bottom of his punt with his feet braced against the sides so that the recoil was distributed as evenly as possible when the punt moved back in the water. The punt guns of the seventeenth and eighteenth centuries were seldom of the calibre seen in the great days of Peter Hawker and his successors and rarely exceeded a 1½ in. bore. They fired charges of from ½–1 lb. of shot at a time, at ranges from 50–100 yd.

At the beginning of the nineteenth century the gentleman sportsman as well as the professional hunter turned their attention to the punt gun. In 1814 Peter Hawker published the first edition of his *Instructions to Young Sportsmen*. He was above all things a wildfowler and he had a particular liking for punt guns, inventing improvements to guns, fittings, punts, and even the carts which carried the punts to the water. One of the problems associated with the punt gun was the control of the recoil. This was usually absorbed by roping the butt of the gun to the bow of the boat, the gun having some freedom of movement on the staunchion and muzzle rest. Another method was by the boot-jack, a padded board bolted to the butt and able to slide smoothly on the floor of the punt. As the gunners in their desire for longer ranges, increased the powder charges of their guns up to 2 lb. the recoil became dangerous. In 1824 Hawker invented a swivel attachment in which most of the recoil was absorbed by a spiral spring, and this was to become a standard fitting on most punt guns.

In his *Instructions* (9th Edit., 1844), he describes the many types of boats used in the sport. They were one or two-man punts or canoes between 15 and 25 ft. long. The two-man type was most popular, the boat being quickly paddled, sculled, or poled into position (Fig. 119). The front gunner then manipulated the gun whilst his companion kept the boat steady and 'on target'. In the one-man punts the gun was often lashed firm, aim being taken by the gunner moving the boat. In all these manoeuvres the gunners kept as low in the water as possible and sometimes wore camou-



119. 'A Shot in the Shallows.' A double-handed punt in action, one man working the gun, the other manoeuvring the punt. From *Shooting: Moor and Marsh* (1886).

flage in order to get as close to the birds as possible. Some of the most fascinating boats were those designed to operate across mud. It must be remembered that with the tide out it was sometimes easier and quicker to approach a flock of fowl by crossing the mud banks rather than by finding one's way out to the sea by a tortuous route and then stalking the birds across the open water. Wildfowlers, carrying the ordinary fowling piece, were accustomed to cross mud patches with the aid of 'mud pattens' or 'splashers', thin wooden boards about 18 in. square which were attached to the feet like snowshoes.[117] The *Hampshire launching punt*, capable of being manoeuvred in most waters, was still light enough to be pushed across the mud with a punt gun in it. The gunner, of course, had to crawl behind it propelling himself along as best he could. A less filthy task was imposed by the *Sussex mud boat* in which a man could kneel on one knee whilst kicking his load along with other leg. When near to the target he lay down in the boat to push the last few yards. The *launching sledge* was simply a light wooden sledge to carry the gun and the gunner could not hope to take to the water if caught by the tide. Most readers agreed with Hawker when he wryly remarked: 'I cannot for a moment suppose that the generality of sportsmen would even think of adopting this method.'

When Hawker began his writings and experiments the punt gun was a muzzleloader fired by a flint-lock. The first factor was a great inconvenience. To load the long barrel a scoop containing the powder on the end of a pole had to be thrust down the barrel. Making certain that this and the charge that followed were seated in the chamber was no easy matter and it was almost impossible to do this in a rough sea. The flint-lock action, with a reasonably waterproof cover, does not seem to have given as much trouble as one would have expected and, at first, the various types of detonating locks were not well received. When the breechloader and cartridge were introduced, the facility of loading with a cartridge soon overcame the gunner's conservative liking for the muzzleloader. Punt guns were made with many types of breeches such as the Snider, the screwed plug, and the break-action ejector.

Punt guns could kill effectively at 200 yd. and Hawker made some experimental shots at 350 yd., but the range which gave best results (all other circumstances being equal) was around

100 yd., and, today, with the most modern of guns that range is rarely exceeded. The great pattern and weight of shot delivered by the punt gun sometimes produced wholesale slaughter and the sea would be littered with dozens of dead and wounded birds, the latter being finished off at close range with a 'cripple stopper' (Fig. 120). Here is Sir Ralph Payne-Gallwey describing a good day's sport off the coast of Holland on 22 October 1889:

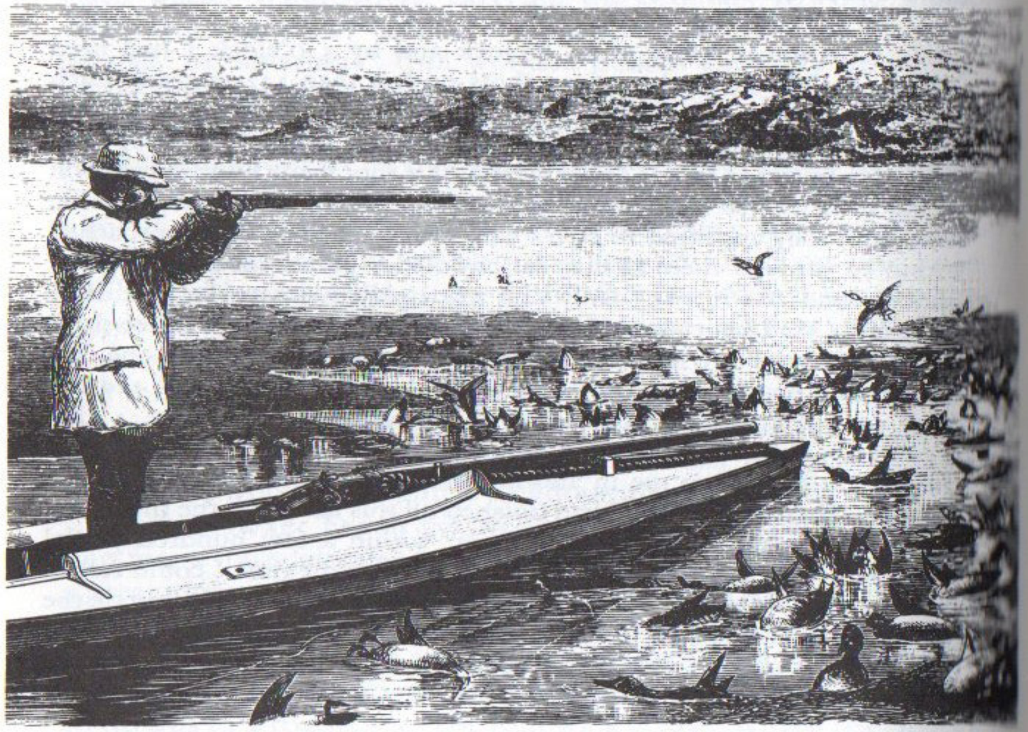
> We went afloat today at 12 o'clock and by 3 o'clock I had fired four shots. I killed in these four shots no less than 132 wigeon! Each shot as follows, 33, 14, 40, 45! The third shot was without exception the best one I ever fired into and had I aimed properly I must have bagged 80 to an 100 birds! There were at this shot many hundred wigeon sitting so close that a pin could not to all appearance be put in between them, and they appeared to cover half an acre of ground. I approached within 50 yards of them as they sat huddled together on a level spit of smooth sand! As it was (badly as I managed) this was the best day's sport of its kind I ever saw or heard of in so short a time! In three shots I killed 119 wigeon! The second shot appears an insignificant one, but the fact is I dropped 25 to 30 birds at it, but after doing so I did not delay to gather them, because of the magnificant shot No. 3 that appeared within a quarter of a mile to windward of me, and because Gould was following me in another boat on purpose to pick up the cripples. Then by the time I had finished off this last shot, the third one, yet another great shot was to be seen within a few hundred yards! At these I went at once and bagged 45! And by the time I could return to the scene of my second shot many of the birds had drifted away on the flood tide. A curious mixture of ecstacy and slavery, and a predominant feeling that I ought (with the glorious chances thrown in my way) to have killed many more birds than I did.[118]

H. C. Folkard, in similar mood, described punt-gunning as *la crême de la crême* of wild-fowl shooting, explaining that sixty to one hundred widgeon had often been stopped by one shot.[119]

The gunner, of course, did not have it all his own way. He faced the hazards of the climate and the sea in a cockle-shell boat; he often returned from an arduous trip empty-handed, and it was not unheard of for his gun to blow up in his face. Hawker, in his *Diaries*, for 19 February 1818, describes how his 96 lb. gun blew to pieces and he was set on fire with a pound of gunpowder in his pocket.

The gunners' appetites were insatiable and both Hawker and

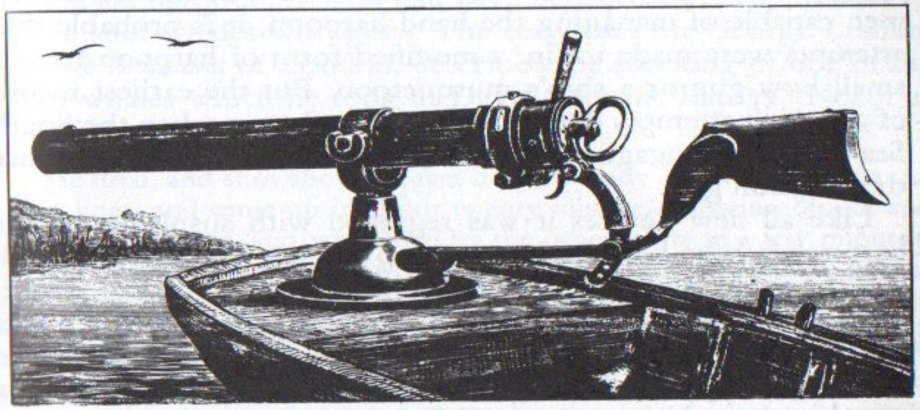
Payne-Gallwey, much to the envy of their contemporaries, had double-barrelled punt guns. Hawker's gun is now in the Museum of the Birmingham Proof House. One barrel was fired by flintlock and the other by percussion, the idea being that the flintlock, being slower to ignite, would set off its charges a fraction later than its companion. Thus one barrel would catch some of



120. Cripple shooting. The punt gunner finishing off wounded birds after firing 2½ lb. of BB shot into several hundred widgeon. From R. Payne-Gallwey's *The Fowler in Ireland* (1882).

the birds on the water and the other the remainder as they rose with their wings outspread. Another punt gunner and author, Lewis Clements, favoured double barrels of elliptical bore, lying horizontally, to get a better spread of shot across the water.[120] Methods of punt gunning differed very little in various parts of the world and it is amusing to note that Chinese punt gunners also favoured double-barrelled guns. These were of very crude

construction and were fired by a slow match. As the latter often alarmed the birds, the Chinese took the precaution of cocking up one barrel to achieve the same effect as Hawker's gun. A gun made specially to remove all possibility of missing a long range target was the seven-barrelled swivel gun (Fig. 121), which was as near to a piece of naval armament as any self-respecting sportsman would care to go.[121] It was the big brother of Pieper's 'mitrailleuse' goose gun which fired seven ·22 long cartridges simultaneously and covered a 3 ft. target at 125 yd. With something not far short of artillery being brought into action it is not



121. A seven-barrelled breechloading boat gun for long-distance work. From R. Corneli's *Die Jagd und ihre Wandlungen in Wort und Bild* (1884).

surprising that in order to prevent the annihilation of the bird population the sport of punt gunning was prohibited in the U.S.A. in 1916, and that, in Britain, the Protection of Wild Birds Act of 1954 limited the size of punt guns to 1¾ in. diameter at the muzzle.

Whaling Guns

Amongst the largest of hunting guns were, inevitably, those employed against the largest of all animals, the whale. In a previous chapter the various spears, harpoons, and lances manually thrown against the whale have been described. That a form of spear should be discharged from a gun at first seems a contradiction of things. But it must be remembered that great spears were at one time hurled by the catapults and ballistae, the siege

weapons of the ancient world. When the firearm began to take over the role of these out-moded forms of artillery it was at first required to project the same missiles. Thus the earliest illustrations of guns which appear in Walter de Milemete's manuscripts of 1326–7 show arrows issuing from their muzzles.

During the Spanish Armada, the English Navy attacked the invaders with muskets firing incendiary arrows and this form of missile is still mentioned in seventeenth-century books on gunnery and pyrotechnics. During the same period when the merchant companies of England and Scotland were competing for the Arctic whale trade and there was a shortage of trained men capable of managing the hand harpoon, it is probable that attempts were made to fire a modified form of harpoon from a small bow gun or a ship's musquetoon. But the earliest record of any such attempts does not appear until 1731 when the South Sea Company, engaged in the whaling business, tried to introduce the harpoon gun.

Like all new devices it was regarded with suspicion by the harpooner, who belonged to a group of men who received high pay for a specialized skill acquired in the hard school of experience. At a later date, G. W. Manby attempting to introduce a new form of harpoon gun met with some opposition. He took part in a whaling expedition with the intention of directing the new guns' trials and correcting any faults on the spot. He believed that the whalers would welcome a weapon which would make their task easier. Instead he had the greatest difficulty in persuading anyone to use the gun and found to his amazement and outrage that it was often sabotaged at the crucial moment. On his return home, in a calmer mood, he described the attitude of the men as unreasonable but agreed that 'if the gun succeeded it might lend to its more general use, and that every man who could point a gun, could act as a harpooner'.[122] In 1733 a ship fitted out by Elias Bird and Company took a harpoon gun with it and proved its worth by taking two out of three whales which the ship eventually brought back.[123]

Difficulties were experienced in attaching these early gun harpoons to the rope. This was usually done by a ring fastened near the head or half way along the shaft, but as the harpoon left the barrel the rope tended to drag it down. In 1771, a blacksmith, Abraham Staghold, produced to the Society for the Encouragement of Arts in London a model of a harpoon with a slotted shaft along which the ring could run freely to its base. This harpoon could be thrust right down the barrel for maximum power and then take the pull of the rope without being deviated from its course.[124] The following year the Society awarded the inventor of a new harpoon gun 20 guineas and ordered six guns with four harpoons each to be sent out to the fishing grounds on the *Leviathan* and the *Rising Sun*.[125] The Society continued for some years to offer annual awards for the successful use of harpoon guns. In 1789, for instance, the *Transactions* of the Society listed six harpooners who had been certified by their masters to have shot whales with guns. The certificate for George Leshley of the *Britannia* of London, described the shooting of one of his two whales which he took in Davis's Straits, Lat. 71° North at ten fathoms:

> He fired, and shot about six feet into the body of the fish; it ran out two lines, and came up in about twenty minutes, blowing blood, and very much spent, and was killed by the other boats in a few minutes: when it was got along-side, we were obliged to heave a tackle to get the harpoon out again. Length of bone, ten feet nine inches.

As the Society remarked with satisfaction in its report: 'the Fish taken were shot at a distance at which it would have been utterly impossible to have secured them by the Hand-Harpoon, every one so taken may be considered as clear gain to the Nation.'[126] In 1793 the Society awarded John Bell, a sergeant in the Royal Artillery, 20 guineas for his model of a new harpoon gun. As might be expected it was the size of a small cannon, but it had a modified carriage with a rope shelf, a tangent dispart sight, and two flint-locks.[127] The Japanese artist Hokusai, in Volume 11 of the *Mangwa* (*c.* 1834), illustrates a full-size ship's cannon of European design being fired at a whale.

The fitting of two well-protected locks, both igniting the same touch-hole, was a sensible precaution taken by most gunmakers in designing a gun which was subjected to much exposure to inclement conditions (Pl. 141). In 1820 the whaling captain William Scoresby gave this description of his gun which he said had a range of 40 yd.

> In its present improved form, as made by Mr. Wallis, gunsmith, Hull, the harpoon-gun consists of a swivel, having a barrel of wrought

iron 24 to 26 inches in length, of 3 inches exterior diameter, and 1⅞ inches bore. It is furnished with two locks, which act simultaneously, for the purpose of diminishing the liability of the gun missing fire. The shank of this harpoon is double, terminating in a cylindrical knob fitting the bore of the gun. Between the two parts of the shank is a wire ring to which is attached the line. Now, when the harpoon is introduced into the barrel of the gun, the ring with the attached line remains on the outside, near the mouth of the harpoon; but the instant that it is fired, the ring flies back against the cylindrical knob.

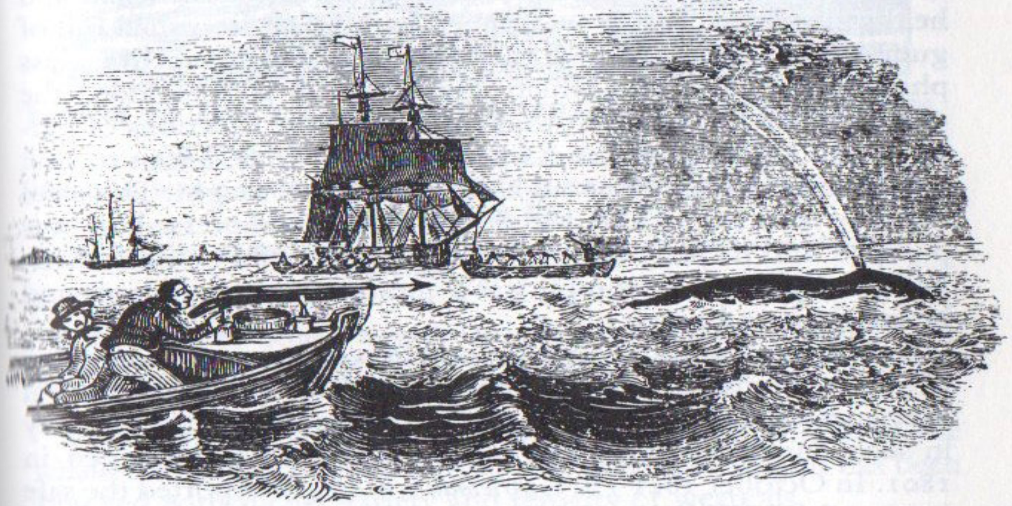
Some harpoons have been lately made with a single shank, similar to the common 'hand-harpoon' but swelled at the end to the thickness of the bore of the gun. The whale line, which is closely spliced round the shank, is slipped towards the mouth of the harpoon when it is placed in the gun, and when fired is prevented from disengaging itself by the size of the knob at the end.[128]

Whilst the flint-lock was the only means of ignition there was always some doubt as to whether the priming would get damp and cause a misfire, and many whalers persevered with the old hand harpoon. But when the percussion lock was perfected the situation was changed and by the middle of the nineteenth century the majority of harpooners were using guns. A typical percussion harpoon gun is described in W. W. Greener's *The Gun*:

It has a stock of ash or wych elm, well bent down to form a handle with which to aim it. The whole of the recoil, which is considerable is sustained by a strong swivel pinned to the stock and barrel. The barrel is 1½ in. bore, the lock simple, being similar to that of a saddle pistol. The cap, nipples, hammer, and lock are securely protected from sea-spray or blows by a brass cover. The lock is securely bolted until a pin is removed, when the gun can be fired by pulling a cord attached to the trigger. The length of the barrel is 3 ft. and the weight of the gun complete about 75 lbs. The harpoon weighs about 10 lbs. with the shackle, and is fired with a 1-in. line attached. The charge of powder never exceeds six drams, for more doubles up the shank of the harpoon. It is rarely used at greater distances than twenty-five yards, but is fairly accurate up to forty; and the late W. Greener, whose harpoon guns were by far the best of their day, obtained in a public contest at London Dock, in 1845, an extreme range of 120 yards. Smaller harpoon guns are sometimes made for shooting white-whales, porpoises, walrus, etc.[129]

At the same time that these improvements were made to the gun, the harpoon was subjected to certain modifications. When

George Manby made his voyage to Greenland in 1820 he took with him not only a new gun but a revolutionary form of harpoon. It was really a shell with spring-out barbs which could be fitted with an explosive head. It was 9 in. long, 2 in. in diameter, and weighed about 5½ lb. As the shell had to be attached to a rope, it was inserted in the barrel the wrong way round, the nose being protected by a cylindrical cap of wood. When the shell left the barrel the reaction of the line inverted it so that in flight it travelled point first—or so the inventor hoped.[130]



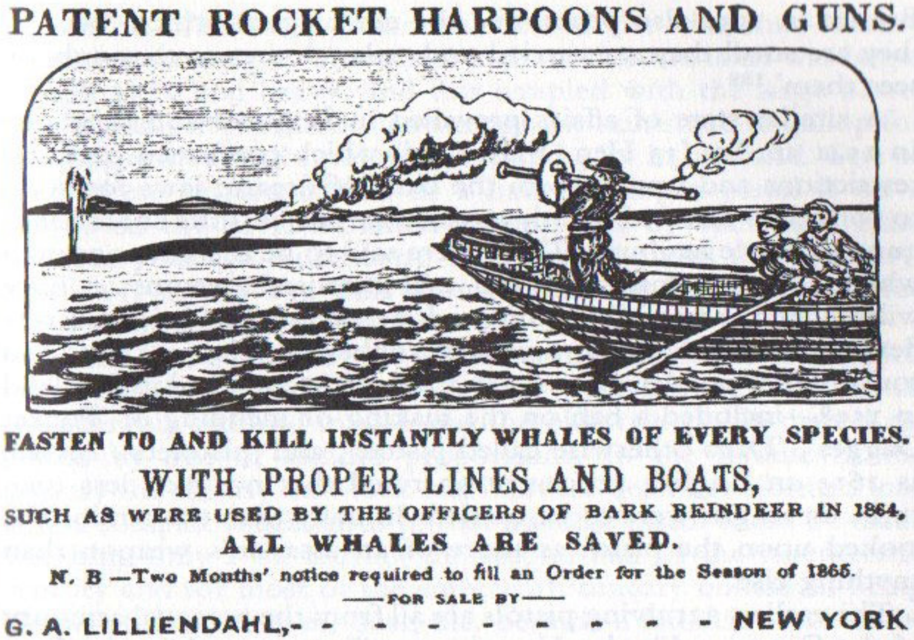
122. Whaling with a harpoon gun. From W. Greener's *Gunnery in 1858*.

Manby's harpoon shell was followed by many others, usually attached to a shank. Devisme in France patented one in 1857. Dr. Thiercelin invented and used a shell filled with poison made from strychnine and curare. American whalers perfected a darting gun which was a combination of manual harpoon and self-firing gun-head. The harpooner hurled the gadget into the whale. On impact the gun portion of the lance or dart fired sending an explosive bomb deep into the monster's vitals. In most cases death was instantaneous.

Modern whaling dates from *c.* 1880 when the harpoon gun invented by Svend Foyn, a Norwegian sailor, came into general use. First designed nearly twenty years previously it was a small cannon about 4 ft. long with a range of 20–25 yd. More

important perhaps than the cannon itself were the new ideas of whaling. The old methods of hunting the whale from small boats were good enough to catch the smaller kind of whale and those of the larger species—the bow-head, the right, and the sperm whales—which floated on the surface when killed. The faster and more powerful whales of the torqual class were too dangerous to be tackled for the reason that they sank when killed and would drag down any boat fastened to them. Foyn's cannon was placed in the bows of a small steam ship. This fired a harpoon with long hinged barbs which opened like an umbrella inside the whale and held it like an anchor. It was tipped with a cast-iron shell full of gunpowder. The action of the barbs opening crushed a glass phial of sulphuric acid which ignited a fuse and exploded the charge inside the whale. It thus discharged the functions of harpoon and lance in one: and when the dead whale began to sink the steamer was large enough to support its weight. Powerful winches then manoeuvred it alongside and compressed air was pumped into its belly so that it floated and could be easily dealt with.[131] From this time on it was a question mainly of bigger and better ships and guns.

Before the harpoon cannon established its supremacy some efforts were made to utilize the rocket. This had already been used successfully as a war weapon by the British Army and Navy in such engagements as the bombardment of Copenhagen in 1801. In October 1821 *The Gentleman's Magazine* reported the safe return of the ship *Fame* of Hull from the whale fisheries with nine whales all killed with Congreve war rockets. The report made much of the fact that one fish was a 100 ft. long finner, a species seldom attacked by ordinary means, and it pointed out that the value of the rocket lay in the fact that 'all the destructive efforts of a six, or even a twelve-pounder piece of artillery, both as to penetration, explosive force and internal fire, calculated to accelerate the death of the animal may be given with an apparatus not heavier than a musket, and without any shock or reaction on the boat'. The rocket undoubtedly killed the whales but it did not capture the carcass and it is noticeable that in the *Whalemen's Shipping List and Merchants' Transcript* of 8 August 1865 an advertisement for a patent rocket harpoon emphasized that it operated with 'proper lines and boats' and that 'all whales are saved' (Fig. 123).



123. Advertisement in the *Whalemen's Shipping List and Merchants' Transcript* of 1865 for Lilliendahl's Patent Rocket Harpoons and Guns. Note the rocket launcher with its flash-guard.

In closing this account of the hunting of such animals as the whale one cannot help observing that only man himself has been attacked with such a variety and ferocity of weapons.

Pistols

The essential quality of a pistol, apart from its small size and portability, is that it can be carried ready for immediate action. Whilst the firearm had to be ignited by match, either held in the hand or placed in the cock of a match-lock, the production of a pistol was pointless. For this reason European match-lock pistols are virtually unknown. With the invention of the wheel-lock in *c.* 1500, however, the way was open to start the long development of the pistol. The realization that men could now carry a loaded gun 'secretly under their clothing' led in the first place to an official discouragement of the wheel-lock's manufacture. In 1517 the Emperor Maximilian I banned the use of 'self-striking handguns' in Lower Austria. This ban was extended to all the territories of the Empire in 1518. A ducal edict issued in

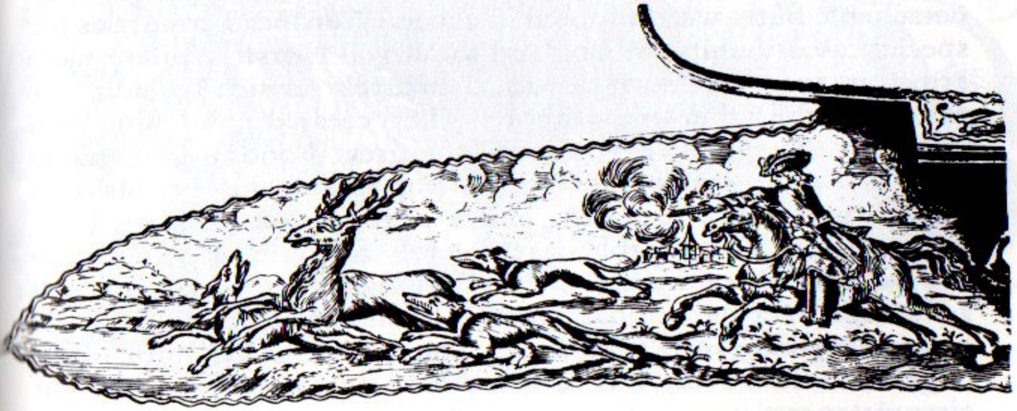
Brescia in 1532 also prohibited the use of guns which 'because they are small they are carried under the clothes so that nobody sees them'.[132]

A similar state of affairs prevailed in England and Scotland. In 1541 an Act (33 Hen. VIII, c. vi) which confirmed previous restrictions and was to form the basis of firearm laws for years to come was directed mainly against the use of 'little short hand-guns and little hagbuts'. These were said to be the weapons with which 'devious malicious and evil disposed persons . . . have wilfully and shamefully committed, perpetrated and done divers detestable and shameful murders, robberies, felonies, riots and routs'. Later proclamations— in England in 1579 and in Scotland in 1598—included a ban on the making or mending of 'Pocket Dagges', 'Dags otherwise called pistols', and 'pistolets'. As late as 1613 an English proclamation ruled that no guns less than 12 in. in length were to be carried. Initially then the authorities looked upon the pistol as more of an assassin's weapon than anything else.

The earliest surviving pistols are all from the personal armoury of the Emperor Charles V and are still preserved in the Real Armeria, Madrid (Nos. K 44, 52, 62). The earliest is dated 1534 and the others are of *c.* 1540. From the middle of the sixteenth century the manufacture of pistols, in spite of the restrictions, began to increase rapidly. Few of them in those early days, were less than 18 in. long and their contemporary name—in Spain—*arcabucillo de arzōn* (little saddle-harquebus) reveals the purpose for which they were intended. The military leaders had quickly realized the potential of the new firearm and had proceeded to arm the cavalry with pistols. A new tactic, the *caracole*, became fashionable. In this a line of cavalry charged up to the massed ranks of enemy pikeman, discharged their pistols at close range, wheeled, and retreated to allow the next line to repeat the manoeuvre.

It did not need much imagination to replace one form of adversary with another and soon the mounted huntsman, who previously chased the game with sword, spear, and crossbow, began to follow his sport armed with a pistol. Paper cartridges for the powder which could be carried in a small box on the waist belt were also available, so that even with these muzzle-loading pistols, reloading was not too difficult a procedure on horseback. The main inconvenience of the sixteenth-century pistol was its weight. The wheel-lock mechanism itself was large, complicated, and heavy, and this coupled with the large barrel and ungainly stock did not encourage the huntsman to gallop for too long with a pistol weighing around 4 lb. in his hand. One of the earliest representations of a hunter using a pistol is on a plaque on the silver-mounted writing box by Hans and Elias Lencker, made in Nuremberg in *c.* 1585, now in the Treasury, Munich (No. 579–83). This shows a man standing behind a tree firing at wild cattle (aurochs?).

By the first quarter of the seventeenth century the wheel-lock pistol had been made much lighter, with the lock and stock considerably reduced in size and the old-style stubby barrel replaced by one of slender proportions. In the middle of the century the clumsy flint-lock had likewise been transformed into a neat compact mechanism so that a saddle pistol could be made weighing only 2 lb. During the second half of the seventeenth century and for most of the eighteenth century huntsmen firing pistols at deer, wolves, bear, etc. became a familiar scene to be found in sporting paintings. It was also a popular subject for the engraving on the lock plates of guns (Fig. 124). The painting by an unknown master of *c.* 1740 in the Deutsches Jagdmuseum, Munich (No. 5032), shows men with a pack of hounds hard on the heels of a stag and fawn. The huntsman is firing at close range with a comparatively small flint-lock pistol.



124. Engraved decoration on the lock-plate of an eighteenth-century wheel-lock showing a stag being hunted with a pistol. *Author's Collection.*

The necessity for being skilful enough to ride one's horse to within a few yards of the game seems to have been the main attraction of this sport. Sometimes the huntsman was not able to do this until the game was exhausted and turned at bay. Thus in an account of a hunt at Lyme organized for the Duke of York in 1676, we read that the stag (14 hands 4 inches high) 'run soe long a chais the D. being one of the 1st that came in, who when he was att bay shott him dead with his pistoll, & had 36 miles to ride that night, wch he did & came home before 8 a clock yt night'.[133]

Attempts were always being made to produce a pistol which, if need be, could be converted into a carbine to be fired from the shoulder. This had an appeal to the hunter who, whilst enjoying the convenience of the unobtrusive pistol, was able to fire at game at much longer ranges. From the latter part of the seventeenth century pistols were made with pull-out or clip-on shoulder butts. One of the most surprising examples of this type of pistol is the English pistol of *c.* 1640 in the Hermitage, Leningrad (No. 3. o. 7063). This not only has provision for a screw-on extension butt, but has an extension barrel which can be screwed on to the end of the pistol barrel, the two accessories converting the pistol into a full-size fowling piece. The barrel is covered with brown leather decorated to simulate a rough stick.[134]

In the latter part of the eighteenth century more attention was paid to rifled pistols, whose utility was particularly enhanced by the addition of a detachable butt. Double-barrelled pistols with detachable butts were adopted in several European countries for special cavalry units. In England the Royal Horse Artillery were armed in 1793 with such pistols, the barrels set side-by-side, one rifled and the other smoothbore. They created something of a vogue in the sporting world and the great London gunmakers Joseph and Durs Egg began producing fine-quality pistols with two barrels over-and-under, and a neat clip-on skeleton butt. These pistols were capable of reasonably accurate shooting up to 100 yd. But there were few occasions when they had any real advantage over the ordinary game rifle and there are no accounts of great hunting feats with them. The double-barrelled pistol of large bore, however, was to come into its own under different circumstances.

In India the pursuit of dangerous game like the tiger was often

conducted from the back of an elephant, the huntsman firing from the shelter of a box-like compartment strapped to the elephant's back known as a 'howdah' or, if canopied, an 'amary'. An account of the hunting expedition organized by Asoph ul Doulah, Nawab of Oude, in the late eighteenth century, speaks of an army of elephants (between 400 and 500 of them) carrying howdahs liberally armed with match-locks. One of the dangers of this kind of hunt was from the tiger springing on to the back of the elephant and attacking the occupants of the howdah at close quarters (Fig. 125). For this reason the Nawab found it an advantage to carry pistols in the howdahs which were of sufficient power to knock down the tiger with one discharge of their barrels. He apparently favoured English pistols for this purpose.[135]

125. The result of not having howdah pistols. A lion has pulled a hunter off his elephant. From J. Greenwood's *Wild Sports of the World* (1862).

When British officers and officials began to join in this kind of hunt there arose a steady demand for this special form of pistol which is now known amongst collectors as a 'howdah pistol'. Its main characteristic are two barrels of 8–9 in. long, of at least ½ in. bore, and strong enough to take a heavy charge of powder. Long range accuracy was not essential but bullet impact was. As that great hunter, H. A. Leveson, put it bluntly: 'to be effective, the muzzle must be placed close to the tiger's head, and care must be taken not to kill the mahout, who is far more exposed to the brunt of the attack than the hunters in the howdah.'[136]

A few flint-lock pistols by such makers as the Eggs and the Mantons come within this category. But the hey-day of this kind of hunt occurred in the percussion and early cartridge era from the 1840s to the 1890s and it is within this period that the majority of howdah pistols were made. Percussion examples are to be found from the workshops of nearly all the top British gunmakers including early specimens from the Purdey family. Some interesting examples of cartridge pistols were made employing pinfire and rare types of centre-fire cartridges. A popular calibre in the latter group was the ·577 short Boxer cartridge. A pistol using this cartridge by William Moore and Grey in the Tower of London Armouries (No. XII–1520), weighs 3lb. 11 oz. (Pl. 110).

From the 1850s onwards the revolver makers, Colt and Smith & Wesson in America and Adams and Webley in England, began to invade the sporting market. Whilst the revolver held the attraction of additional shots, the gap between barrel and cylinder on nearly all examples meant a decrease in muzzle velocity, and no revolver of that time could produce the stopping power of the high-velocity, large-calibre, double-barrelled pistol. A compromise was offered by the four-barrelled pistols of Charles Lancaster of London and the Belgian firm of Braendlin & Co. Both types of pistol had a hinged, gas-tight joint at the breech and fully enclosed mechanisms operated by a single trigger. Each barrel of the Braendlin 'Mitrailleuse', as it was called, had a separate striker and spring and the shock of the recoil of one barrel could accidentally set off a second barrel. In the Lancaster a single revolving striker prevented such an occurrence. The rifling of the latter was of Lancaster's oval-bore type so that shot cartridges could be used if required, and calibres of ·455 and ·577 to take government regulation cartridges were available.

The barrels were angled to converge at a distance of 40 yd., considered the maximum effective range with ball.

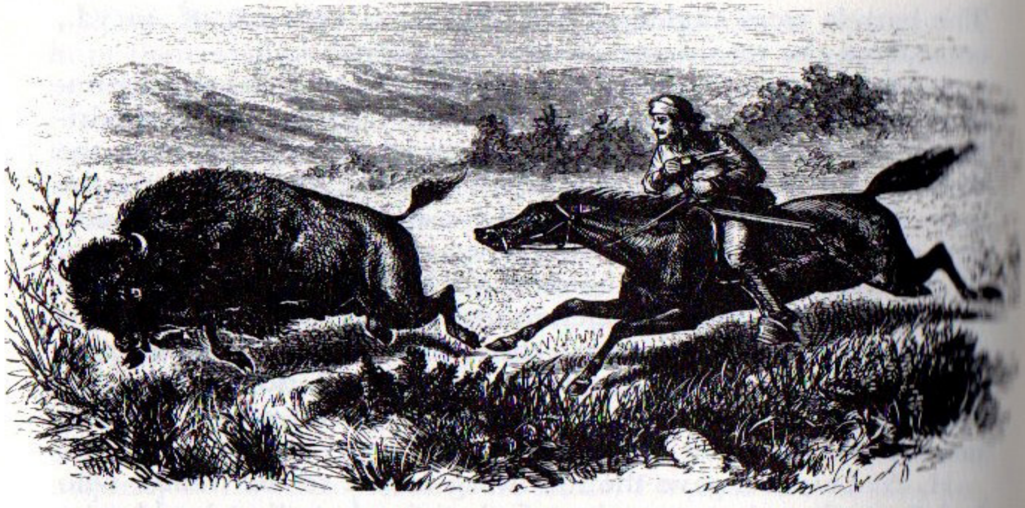
As the design and effectiveness of the revolver was rapidly improved between 1850 and 1880, the heavy, rather clumsy multi-barrelled pistol lost any advantage over its rivals. In America the revolver from its practical inception in the 1840s became the second weapon of the hunter and for at least one kind of hunt, that of the buffalo, it was sometimes used as the main weapon. The professional buffalo hunter might be content to knock down his game with ruthless efficiency with a rifle, such as the Sharps, from a concealed position; but those who liked to combine sport with the hunt followed the Indian practice of riding down the buffalo on horseback. The white man, however, used a revolver instead of a bow and arrow.

H. A. Leveson gave the following advice to the hunter who had first taken the precaution of obtaining 'a well-trained horse, which enjoys the chase as much as his rider':

> Give such a one the rein, and with ears set back and tail playing in the air, he will soon bring you along-side of your game, and with a free, steady stride, keep pace with the buffalo, careering along in 'a lob-lolloping canter', within ten feet of you. Until this time your revolver should be in your belt or holster in case of accidents; then, with the thumb of the hand in which the pistol is held, you cock the weapon, the hammer being raised as the pistol is thrown up, and, aiming just behind the shoulder blade, and about two-thirds down from the top of the hump, you deliver your fire, the report being the signal to your horse to wheel off and prepare for squalls.'

All this was 'capital fun' (Fig. 126).[137]

To anyone unaccustomed to such riding the difficulties of firing accurately can be imagined. In 1871 the Grand Duke Alexis of Russia visited the Smith & Wesson factory at Springfield which was at that time engaged on a large contract making ·44 calibre revolvers for the Russian government. He was presented with an elegant, gold-inlaid model. Later on his tour of the U.S.A. he was invited to a buffalo hunt with the famous Buffalo Bill as his guide. An eye-witness described the Grand Duke's hunting dress as 'very appropriate and simple. It consisted of jacket and trousers of heavy gray cloth trimmed with green, the buttons bearing the Imperial Russian coat of arms; he



126. Buffalo hunting with a revolver. From H. A. Leveson's *Sport in Many Lands* (1877).

wore his boots outside his trousers; his hat was an Australian turban with cloth top. He carried a Russian hunting-knife and a Smith & Wesson revolver recently presented to him and bearing the coats of arms of the United States and of Russia on the handle.' Unfortunately although he fired his revolver six times at close range he did not succeed in bringing down one animal.[138]

A more experienced hand at the game was Colonel G. W. Schofield who made several useful modifications to the original ·44 calibre Smith & Wesson revolver. Whilst he was engaged with his experiments, he wrote to D. B. Wesson on 3 January 1875: 'Have killed almost everything—but an Indian—with it and used it in all kinds of weather & in the roughest sort of way. On my last trip I loaded twice with my horse at a run and killed a buffalo each time.'[139] The favourite revolver for buffalo hunting, however, was undoubtedly the Colt Frontier model, of single-action cocking, but accurate and powerful. The artist George Catlin did several illustrations showing the use of Colt revolvers in hunting buffalo and other game. His favourite revolver, however, was a Colt revolving carbine which could be loaded with either shot or ball and which he nicknamed Sam. Sam, 'a six-shot little rifle, always lying *before* me during the day and *in my arms*

during the night', is mentioned frequently in his books.[140] Another firm advocate of the ·44 calibre Smith & Wesson revolver was the famous marksman Walter Winans. Writing when the 'good old days' of 'buffalo running' were over he gave instructions for the tame sport of shooting fallow deer with a revolver from horseback. This was conducted in the sedate and refined atmosphere of an English park. Somewhat tentatively he suggested that his fellow sportsmen in India might adopt the same method for killing pig, but concluded that that would be regarded as a heresy.[141]

As the larger calibre revolver fell back into its role of a weapon for personal defence, there was a revival of interest, particularly in America, for the pistol with a detachable or folding stock. Known as the 'Pocket Rifle', it was made by such firms as the Stevens Arms and Tools Company of Chicopee Falls, Mass., in calibres ranging from ·22–·44 in. and barrel lengths of 10–24 in. It was sufficiently accurate at ranges up to 200 yd. and was a good knock-about weapon for small game. Its adaptability can be judged by the fact that the 1895 Sears, Roebuck and Company Catalogue advertised a ·22 calibre pistol with a pull-out metal shoulder stock as a 'Bicycle Rifle'. Several manufacturers in Europe followed suit with similar pistols; Webley & Scott in England producing in 1910 a single-shot ·410 calibre 'Game and Vermin' pistol with a detachable wooden shoulder stock.

Airguns

The propulsive power of compressed air was known to the scientists and writers of ancient Egypt. Ctesibius of Alexandria designed in *c.* 250 B.C. a stone thrower whose propulsive power was obtained from a compressed air action.[142] It was not until the Renaissance, however, that the airgun made its appearance. Leonardo da Vinci in his notebooks of *c.* 1500–10, described the manufacture of a copper plate and wire barrel for either an air-gun or a blow-gun which 'shoots with marvellous force'.[143] According to Feldhaus, Hans Lobsinger of Nuremberg, in 1550, deposited with the magistrates of that city specifications of several inventions of which one was an airgun. Although the details have been lost, the record of the deposit still exists.[144] In 1591 J. B. Porta gave a description of an airgun in his *Magiae Naturalis* but its meaning is difficult to understand. The first

illustration of an airgun appears in Rivault de Flurance's *Les Élémens de l'Artillerie* of 1607.[145] This gun was made by the French gunmaker Marin le Bourgeoys and was supposed to have a range of 400 yd.

There are still surviving specimens of airguns made before this date. One gun of the late sixteenth century, in the Kunsthistorisches Museum, Vienna (No. D 159), is made to look exactly like a wheel-lock gun (Pl. 145). Another of the same period, in the Livrustkammar, Stockholm (No. 1196), is entirely covered with velvet giving no indication of the underlying mechanism. In both these sporting airguns, an interior cylinder houses a piston which is pulled back against the pressure of a spring when the lock is wound up. Pressure on the trigger releases the piston which is driven forward with enough force to direct a gust of compressed air into the barrel. This type of gun is known as the spring airgun.[146] Then, as now, there was a limit to the power which such a gun could generate. In another group of airguns, not apparently developed until the beginning of the eighteenth century, the barrel obtained its compressed air from the sudden closing of a pair of bellows concealed in the butt. The bellows gun was the weakest of all the airguns and was mainly used in indoor shooting galleries. As such it does not concern us here.

From the inception of the airgun the intention was not to create an expensive toy but to find a substitute for the firearm. If the airgun maker could find sufficient power to rival that of a charge of gunpowder then his weapon would have many advantages. It was practically noiseless and thus did not frighten away the game in the neighbourhood. There was no burning match or tell-tale puff of smoke from priming powder to alarm the bird or animal being aimed at. The lock did not need the same careful protection from the weather and there were practically no misfires. When the lock was discharged there was no obscuring cloud of smoke and time lag to distract the aim until the bullet was expelled. Although the airgun was initially the more expensive arm, the saving in the cost of gunpowder soon made up for the difference in price. All that had to be done was to design an airgun which could utilize air considerably more compressed than that produced by the single stroke of the spring gun.

During the sixteenth century numerous pneumatical experiments were conducted and spheres or other suitable containers into which air was compressed or from which air was extracted were successfully tested. By the end of the century enough experience had been gained to enable gunmakers to manufacture a gun incorporating an air reservoir of some kind with safety. Marin le Bourgeoys's gun of 1607 had a hollow butt to store compressed air. Another gun of probably similar construction was described by an English visitor to Rome on 13 March 1624/5:

> Yesterday I saw a new Invention found out in this Cittie by an Ingenier of Fountaines, native of Urbins, Who hath invented a harquebuse or gunne, not for fire but for Winde. This gunne is charged easily with Winde, to Wit the Stocke thereof and not the bore; But the bore is afterwards charged with a bullet of lead, The Which bullet is discharged and shott forth from the gunne not otherwise, then doth an other peece that is charged with powder and shot with fire, Where in this there is but aire or Wind. The which beeing enclosed and shut up and receiving afterwards a sudden issue of the bore, driveth forth the bullet with such force that it peerceth any boord, and passeth very straight; so that yesterday I saw a sparrow shot thereby from a tree, that was very high. There are as yet made but three of these peeces, Each one for fortie Crownes; Whereof Two have beene sent into Spaine, And the Third is here. The Stocke and the gunne all together are made of Brasse and doe Waighe in all foure pound, and are broad about six hands, It makes but a very little noise so that it makes no beast afraid. If one holds the hand before the bore, When it is discharged without a bullet, he feeleth nothing but a vapor of Winde. And the peece being charged with Winde, doth thus charged remaine in its strength the space of 24 houres: But if it bee kept longer charged, Then the aire or Winde doth passe and vanish by insensible pores and beeing shot off it makes no more noise at all and driveth hardly out the bullet.[147]

The majority of pump-up airguns made in the seventeenth century had what was in effect a double-barrel, one within the other. The inner tube was the barrel proper and the space between the two was used to store the air driven into it by a kind of bicycle pump built into the butt. Two of the earliest airguns, both dated 1644 and signed by Hans Kohler of Kitzing, near Wurzburg in Germany, now in the Livrustkammar, Stockholm (Nos. 1252–3), are built in this way. Another gun of this type made by Johann Kock of Cologne in 1654 and preserved at Skokloster, Sweden (No. BB 52), has an interesting hunting

scene engraved on the lock. In the background men are attacking a boar with spears, but in the foreground another hunter is engaged in pumping up his airgun—the gun held upright near the muzzle with the pump handle on the ground—whilst at his feet lies proof of his skill, two hares and a fox (Fig. 127).

127. Engraving on the lock of an airgun by Johann Kock of Cöllen (Cologne), dated 1654 (*Skokloster* No. BB 52). A hunter on the left is pumping up his gun with a piston fitted to the butt.

The airgun had obviously progressed to a point where it could be used against birds and small animals. In the second half of the century the airgun's performance was further improved, if one can judge by Gaya's statement that he had seen an airgun capable of piercing a door two fingers thick 30 paces away ('*une Arquebuse qui se chargeoit avec le v vent, & dont la bale perçoit de trent pas une porte épaisse de deux doigts*').[148] About the same time the airgun's action was modified. In the early pump-up guns all the air in the reservoir was released when the trigger was pressed and the valve opened. In 1644 Maria Mersenne of Paris published a diagram of a pump-up gun in which one charge of compressed air could be used to discharge several shots.[149] John Wilkins in his

English translation of Mersenne's book, published in 1648, spoke of the power of 'that late ingenious invention of the winde-gun' and how 'a leaden bullet shot from one of these gunnes against a stone wall, the space of 24 paces from it, will be beaten into a thinne plate'. But he expressed his doubts of the intention to make 'the same charge of air to serve for the discharge of severall arrows or bullets after one another.'[150] Nevertheless in 1653–5 George Fehr of Dresden made a series of guns and pistols with just this kind of operation and it soon became common practice.[151] A curious common feature of the Fehr airguns is that the external brass cock is in the form of a lion's head. An airgun lock in the Kunsthistorisches Museum, Vienna (No. WS 105), by Leonhard Gindtner (Günther), also has a cock shaped like a lion. In 1655, a plotter against the life of Oliver Cromwell was reported to have 'bought at Utrecht a gunne, which shewts with wynde only a bullet a 150 paces, and that 7 times one after another, with one charging with wynde'.[152]

The pump-up gun with the barrel reservoir continued to be popular well into the eighteenth century. In 1694 and 1702 John Shaw, the Gunmaker-in-Ordinary to William III, issued long bills for repairs to the King's sporting guns. These included such items as:

For fixing and Repairing a Wind Gun makeing a Click soldring ye Barr[ll] in sev[ll] places . . .	10 . *od.*
Fixing & reping a Wind Gun, making suckers, new Leathers & sodering the barre[ll] . . .	10 . *od.*[153]

From these items one gathers that difficulties were found in keeping the barrel reservoirs airtight. The finest of all these guns was that made by Johann Gottfried Kolbe, who worked in London from *c.* 1730–40, for George II. It has a silver encrusted barrel reservoir with a pump concealed in the silver-decorated walnut butt. Its chiselled steel and gilt lock looks like a flint-lock.[154] The same gunmaker is credited with the invention of a magazine-loading mechanism.[155] Although one charge of air was sufficient for a number of shots, up till now there still remained the problem of feeding the ball into the barrel either via the muzzle or by some breech opening. The addition of a magazine of bullets which could be fed swiftly into the barrel turned the airgun

suddenly into a very lethal weapon. Diagrams of Kolbe's magazine airgun appeared in several English encyclopedias but few specimens have been found. A much simpler magazine and feed action was in any case devised by the Austrian gunmaker Bartholomew Girardoni in 1779.[156] In this gun the screw-off metal butt acted as air reservoir and, as the pump was separate, several spare butts ready charged with compressed air could be carried if required. The lock mechanism was neat and simple and the balls were contained in a tubular magazine alongside the barrel, being fed into the barrel by a cross-sliding breech block. Being loaded at the breech the barrel was suitable for rifling. Something like 500–600 strokes of a hand pump were required to fill each butt, but this was sufficient to fire 30 effective shots; 10 at 150 yd., 10 at 120 yd., and 10 at 100 yd. The range dropped as the pressure decreased.

Although the Girardoni airgun achieved its greatest success as a military arm in the hands of sharpshooting units of the Austrian Army, many fine hunting guns were made on the same principle by such makers as Contriner and Fruhwirth of Vienna and Staudenmayer of London. With its heavy cone-shaped butt the Girardoni was somewhat awkward to handle and for those sportsmen who preferred the conventional wooden butt, an airgun was devised with the air reservoir in the shape of an iron or copper sphere, which could be screwed below or on top of the barrel. This type of pump-up gun which seems to have been introduced in Europe at the beginning of the century[157] was not normally fitted with a magazine action because of the difficulties of construction. This was not such a disadvantage as it may seem because many sportsmen preferred to load the barrels singly and carefully in order to obtain greater accuracy and power.

Ball guns were mentioned in a hunting book of 1779 where it was stated that generally 300 strokes of the pumps were necessary to fill the ball with compressed air, this charge being sufficient for 20–24 shots. For the first 6 shots the power was sufficient to pierce a deer at 70 or 80 paces. To increase the power and thus the range the valve could be adjusted to allow a greater volume of air to pass into the barrel for each shot. A counting device was often fitted to the gun so that the hunter would not attempt a shot with too little pressure.[158] In 1905 an air rifle from the arms collection of Schloss Pfaffroda in Saxony was carefully tested at

the government experimental station of Neumannswalde. The 9·5 mm. lead ball was wrapped in thin paper for each shot. At 35 m. a fir board 3 cm. thick was penetrated and the conclusion was reached that big game could be killed at distances up to 100 paces.

In the seventeenth and eighteenth centuries the airgun was available by reason of price and legal restrictions[159] only to the

128. A nineteenth-century air-gunner uses a separate pump to load his gun whilst his companion shoots at birds in a tree. From T. Deyeux's *Le Vieux Chasseur* (1850).

wealthy sportsman and it appears to have been purchased mainly as an item of curiosity. In 1700 the Landgrave Carl of Hesse examined some airguns made by J. B. Güntner at Basle. One was said to be capable of a range of 400 paces and another, of the repeating variety, could discharge 12 shots at 100 paces. Güntner is reported to have charged as much as 100 gold pistoles for the latter kind of gun.[160] The Landgrave, on this occasion, contented himself with buying a good plain single-shot airgun. His successor Ludwig VIII of Hesse (1691–1768) was probably the greatest exponent of the art of hunting with the airgun. His

armoury at Kranichstein included twelve muzzleloading air rifles with calibres of 13–14 mm. (approximately ·55 in. or 28 bore). These were used chiefly for large game. In 1747 his bag with these airguns included a stag of 22 points weighing 480 lb. and in 1749 he killed over 100 wild boar. He also had a number of smoothbore brass-barrelled airguns of approx. 9·7 mm. (·38 in.) for small game and target shooting. These were of the concentric barrel-reservoir type with pumps in the butts. Three other guns were said to be suitable for use either as airguns or with gunpowder as firearms.[161]

The English sportsman, Colonel Thomas Thornton, was an enthusiastic advocate of the airgun. *The Times* of 29 October 1801 states that he was instrumental in introducing North of England sportsmen to the weapon by winning a wager against a well-known shot that he could kill more game with his airgun in a given time than the other man could with his double-barrelled shotgun. In 1802, during a tour through France, Thornton demonstrated his air rifle at the Versailles Arms Factory, where he shot to within 1 in. of the centre of the official target at a range of 93 yd. With the same rifle he shot a small wild boar through the heart at about 50 yd. He describes shooting a roe-buck whilst out with the hounds and the effect of the ball: 'it had broken the shoulder, and being turned by the bone, had come out through the skin of the neck. This was deemed very extraordinary; but I once shot a deer with the same gun, at Thornville Royal, which was in the act of leaping a fence, the ball went in at the shoulder exactly opposite the heart, but it turned at the belly between the skin and the intestines and came out at the hock.'[162]

Thornton was probably one of the last sportsmen to use the airgun extensively for hunting. Either through bad workmanship or over-enthusiastic pumping, the ball reservoirs and, to a lesser extent, the butt reservoirs of airguns were susceptible to explosion with unpleasant results to the pumper. Sometimes it was simply a case of a man losing count—some balls required 800 strokes for a full charge—and blowing himself up through exhaustion. Captain Lacy summed up many sportsmen's feelings in *The Modern Shooter* (London, 1842), p. 301, when he wrote:

> once I was the master of an air-gun which like most guns of mine, was never allowed to lie long idle. I used to shoot rooks and rabbits with it by day, and at nights to snuff candles with it at fifteen or twenty yards distance, and very true it shot. How many a time have I and five or six of my friends, taken it in turn to pump air into those balls which were of iron—far more dangerous than copper balls, because when those of iron burst they fly in pieces, whilst the others are merely rent in the weakest part whence the air escapes—oiling and pumping till we were exhausted. It was great mercy that no accident ever happened to us. After I had had this gun just long enough to become partial to it, I received intimation that a faithful servant of a relation of mine, whilst filling one of these copper balls with air for his master's gun in rook-shooting, had received his death blow; the screw of the valve gave way, and the ball went through the poor fellow's body. In short, the principle of these guns, how scientific soever it may be, is insecure, and, therefore, the utmost caution affords no certainty of safety.
>
> I immediately bid a sempiternal adieu to air-guns, and disposed of mine forthwith.

Attempts had been made as early as 1768 to harness the power of gunpowder for the purpose of charging the air reservoir and an airgun was made at Turin by a M. Mathi in which 2 oz. of powder was exploded in a brass cylinder to produce the compressed air. The gun was said to be capable of firing 18 shots at 60 paces from one charge of air produced in this fashion.[163] By the middle of the nineteenth century, however, the airgun was regarded as suitable only for light work, and as the cheap 'tinplate' guns of the spring type—the Daisy, the Globe, the Matchless, etc.—began to flood the markets in America and Europe, the airgun was left with few pretensions to be regarded as a serious weapon.

A popular feature of Victorian and Edwardian life was the walking-stick airgun. These air canes were normally supplied cased with pump, foot rest, bullet mould, and other minor accessories. Interchangeable barrels, rifled or smooth, were offered by the makers and variety was introduced into the sport by the provision of harpoons so that the hunter could shoot at a rising fish and, if lucky, haul it out. E. M. Reilly in a pamphlet published in 1850 advertised the following:

> Harpoons with feathers and stout ferrules, not exceeding sixty gauge, nine shillings per dozen.
>
> Barbs of various patterns from six shillings per dozen.
>
> Harpoons of larger sizes, and made upon other principles, barbs and points, at proportionate prices.

It is not advisable to order as many barbs, or steel points of any kind as of harpoons. The velocity with which they are propelled often slivers the wood into pieces on striking a hard surface, though the barb may not be injured; thus four barbs (forked at one shilling each) would probably 'be a fair proportion to a dozen harpoons.'[164]

129. Airgun advertisement from the 1876 Catalogue of James Bown of Pittsburgh, Pa., U.S.A.

An airgun specially designed to shoot small harpoons was produced by the Italian mechanic Antonio Nordio in 1936.[165]

Chapter Seven

Miscellaneous Weapons

The Lasso and the Bolas

The rope or creeper noose has been a hunting weapon since prehistoric times. Set up or suspended in the tracks of wild animals, attached to the end of a long rod for fowling or even for fishing, it was the cheapest and simplest of hunting devices. To give mobility and to increase the range of the noose the lasso was devised. The lasso is a rope with a noose at its end, and is normally thrown from horseback. An early example of its use can be seen carved on 'The Hunter's Palette', the Egyptian slate tablet of *c.* 3500 B.C., now in the British Museum (No. 20792). Assyrian bas-reliefs at Nimrud show what appear to be scenes of the lassoing of onagers. In the Roman mosaic at Utique a mounted hunter can be seen lassoing a stag.[1] The Etruscan tomb known as the '*Grotta dei Rilievi*' has numerous carvings and paintings of weapons upon the walls, amongst which is a coiled-up rope and a noose which may be intended for a lasso.[2] Embossed figures on Scythian amphora found at Chertomlyk show Scythians breaking-in horses with the aid of lassos.[3]

Its effectiveness can be judged by the fact that, from time to time, it has been successfully employed as a weapon of war. Herodotus, in his enumeration of the army of Xerxes at Doriscus wrote:

There is a certain nomadic race called Sagartians, of Persian extraction and language, they wear a dress fashioned between the Persian and the Pactyan fashion; they furnished eight thousand horse, but they are not accustomed to carry arms either of brass or iron, except daggers: they use ropes made of twisted thongs; trusting to these they go to war. The mode of fighting of these men is as follows: when they engage with the enemy they throw out the ropes, which have nooses at the end,

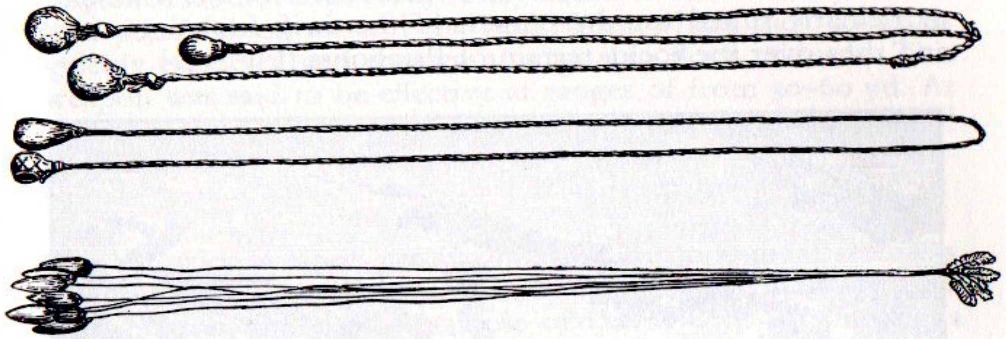
and whatever any one catches, whether horse or man, he drags towards himself: and they that are entangled in the coils are put to death.[4]

One of 'the five weapons of war' listed in the Sinhalese *Mahawanso* was a rope with a noose, running in a metal ring called *narachana*.[5]

Although other instances can be quoted of the lasso's employment in war, it was primarily a hunter's weapon and, as such, has been used in nearly every country of the world. Scandinavian and Lapp hunters have relied on it for the capture of reindeer and bear; native hunters have been known to take puma with it; in Nepal heavy lassos were employed in the capture of elephants. But it was on the plains of North and South America that the lasso became famous through the exploits of cowboys and gauchos, and it is still largely used there in the control of herds of cattle and horses.

The American lasso consists of a strong leather rope from 40–65 ft. long, one end terminating in a ring, generally of metal, by which the loop is made. Ropes of silk-grass fibre and horse hair have also been used. The act of lassoing looks simple. The hunter makes a loop of from 5–8 ft. in length. Held firmly in the right hand this is whirled rapidly round and round above the head and then launched at a range of 20–25 yd. so that the loop falls round that part of the animal—the neck, horns, or legs—chosen as the most likely to bring it down for capture or kill. The method of throwing the lasso can be varied and in one way, known as the 'corral drag', it is first trailed behind and then whipped forward with an underhand motion. The accuracy with which it can be thrown on a given spot with the rider at full gallop is astonishing and skilled performers have been known to ride down and lasso mountain lions and bears.[6]

Nevertheless this skill was not easily acquired and the lasso had a limited range. An equally effective weapon under certain circumstances but with a longer range was the Bolas (i.e. the Balls). It has the unusual distinction of being, at least in modern times, confined to one part of the world—the continent of South America.[7] The bolas were made in three kinds; a single ball on a single thong, or two or three balls attached to cords, the ends of which were joined together. The cords, made of plaited or twisted leather, were from 3–5 ft. long; the balls, made of iron, wood or stone and enclosed in leather, weighed from 1–1½ lb. The



130. *Above*: Leather-covered bolas from South America. *Below*: Eskimo bird bolas made of ivory.

single bola was known as the *bola perdita*, the double form as the *somai*, and the treble variety as the *achico* (Fig. 130).

Charles Darwin described the method of throwing the bolas as follows:

> The Gaucho holds the smallest of the three [balls] in his hand, and whirls the other two round and round his head; then, taking aim, sends them like chain shot revolving through the air. The balls no sooner strike any object, than, winding round it, they cross each other, and become firmly hitched. The size and weight of the balls varies according to the purpose for which they are made: when of stone, although not larger than an apple, they are sent with such force as sometimes to break the leg even of a horse. I have seen the balls made of wood, and as large as a turnip, for the sake of catching these animals without injuring them. The balls are sometimes made of iron, and these can be hurled to the greatest distance. The main difficulty in using either lazo or bolas is to ride so well as to be able at full speed, and while suddenly turning about, to whirl them so steadily round the head as to take aim: on foot any person would soon learn the art.[8]

Another method was to grasp the thongs at the point of union and whirl all three balls together. Either way the effect was to project a pattern of shot, roughly 8 ft. in diameter, whose object was to entangle and disable rather than to kill outright. George Catlin gave a similar description of the bolas and painted them in action.[9] He stated, however, that each branch of the bolas could be as much as 8–10 ft. long increasing the pattern to nearly 20 ft. wide. Estimates of the bolas's range vary from 30–60 yd.

on foot and from 80–100 yd. on horseback.[10] It was a weapon particularly suited for the pursuit of the swift-footed guanaco and rhea over the rocky terrain of Patagonia (Fig. 131).

131. Hunting llamas and rheas with bolas in Paraguay. After Berger.

The Eskimos used a similar but much lighter weapon to catch birds on the wing. The bird bolas consisted of from four to ten ivory or bone weights fastened to cords 24–30 in. long, the ends being joined together in a short handle of grass or feathers. The cords were made of sinew or the intestines of seals, and the weights, which were usually of spherical or ellipsoidal shape, were

fashioned from walrus ivory. They could be conveniently carried in a pouch slung around the neck from which they could be quickly extracted and thrown at a passing flock of birds. This weapon was said to be effective at ranges of from 30–60 yd. At Point Barrow, U.S.A., it was known as the *kalauitautin*[11] (Fig. 130).

Slings

The throwing weapon *par excellence* and of undoubted antiquity was the sling. The Bible (1 *Sam*. XVII, 40) provides, amongst other stories, the classic example of David with his sling. His skill was not unusual for the *Book of Judges* (XX, 16) tells us that amongst the tribes of Benjamin 'were seven hundred chosen men left handed; every one could sling stones at an hair breadth, and not miss'. The sling was well known and used as a military and hunting weapon in all the countries of the Ancient World. According to Pliny it originated amongst the Phoenicians, but Vegetius in his *De Re Militari*, attributes its invention to the people of the Balearic Islands. The Balearic slingers were certainly famous for their skill. Virgil uses the phrase '*figere dammas Stuppea torquentem Balearis verbera fundae*' which Dryden translates as:

> With Balearic slings, or Gnossian bow
> To persecute from far the flying doe.[12]

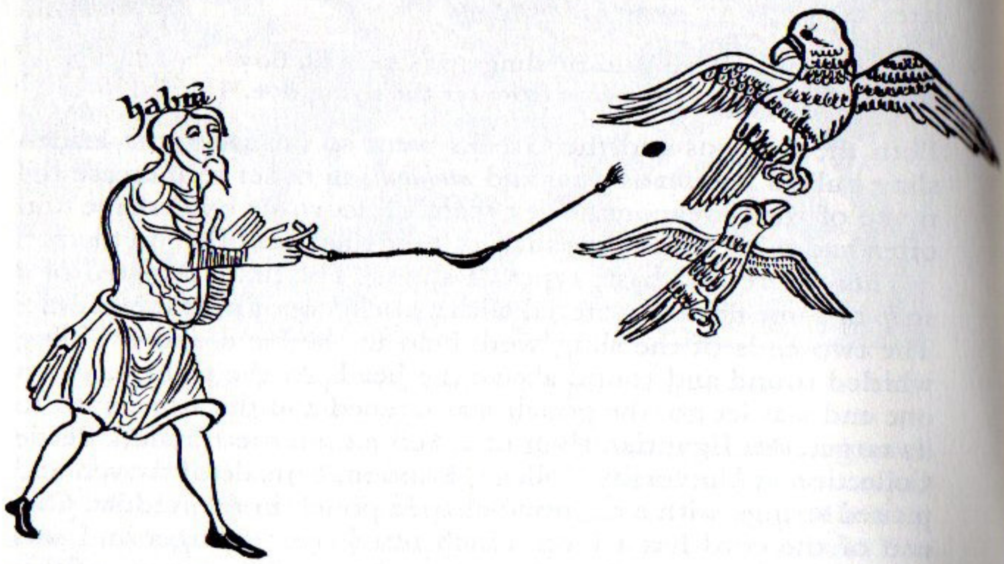
Both the Romans and the Greeks went so far as to cast leaden sling bullets known as *glans* and *molubdis* in order to increase the range of their weapons. They were of acorn or oval shape and often had suitable mottoes such as 'take this' inscribed on them.[13]

There were two basic types of slings. The first consisted of a strip of some flexible material with a pocket at or near the middle. The two ends of the sling were held in the hand and the sling whirled round and round above the head. At the right moment one end was let go, the pouch was opened and the stone sped to its target. An Egyptian sling of *c.* 800 B.C. in the Flinders Petrie Collection at University College, London, is made of woven and plaited strings with a diamond-shaped pouch in the middle. One end of the cord has a loop which fitted over a finger and was retained in the act of throwing. A modern reconstruction of this sling achieved ranges of from 50–100 yd.[14] The strip of material

could be replaced by two cords holding the pouch, and the latter was sometimes dispensed with, the bullet being grooved to seat it in the cords.

This group of slings was the most common. Examples can be seen in early use, mainly against birds, on Egyptian carvings and on Pompeian and Etruscan frescoes such as those in the 'Tomb of Hunting and Fishing' in the Etruscan Necropolis, Tarquinia.[15]

Illustrations in Anglo-Saxon manuscripts give a clear picture of how they were operated. In the eighth-century example, to be found in Cotton MS. Claudius B.iv. in the British Museum (Fig. 132), the slinger retains the sling after the throw with his middle finger hooked through the loop in exactly the same way as that of the Ancient Egyptian hunters. A very similar release action is portrayed in the border of the Bayeux Tapestry.[16] An early thirteenth-century manuscript in the British Museum (Harl. MS. 4751, f. 8) shows the sling being swung preparatory to release. A scene showing a slinger attacking birds over a plough in the *Luttrell Psalter* of *c.* 1340[17] is interesting because the huntsman can be seen carrying a supply of stones in a fold of his dress.



132. A Saxon slinger attacking birds. From the eighth-century Cotton MS. Claudius B. iv. in the British Museum.

133. The staff sling. From Vegetius's *De Re Militari* (1523).

The second group of slings which includes the Roman *fustibalus* and the Anglo-Saxon *staef-lidere* all involved the use of a stick or staff. Vegetius describes the staff as 4 ft. long with a leather sling in the middle.[18] The type to which he was referring was one in which one cord of the ordinary hand sling was fastened to the end of a stick, the other cord being made long enough to be held with the butt of the stick and thus give an extra length to the radius of the swing and hence convey an additional velocity to the bullet (Fig. 133). Another type of staff sling, which seems to have been employed mainly in military service, consisted of a stout staff with the pouch held securely to it by one cord a few inches from the end. The other cord was fitted with a ring which slipped over the point of the staff. With a ball in the pouch the staff was grasped in both hands and swung from behind straight over the head in the manner of a man driving a stake with a mallet. At a certain point the stone shot forward forcing the ring off the end of the staff and opening the pouch. Such an action is illustrated in the thirteenth-century manuscript of Matthew Paris in the Library of Corpus Christi College, Cambridge.[19] Leonardo da Vinci left notes and drawings of various sling mechanisms including the staff sling.[20]

The sling has not entirely disappeared today and was to be found until recently on many of the islands of the Pacific. In 1878 a visitor to New Britain reported seeing a native hunter knock a bird out of a tree at a range of about 100 yd. The sling was formed of two strings about 2½ ft. long, the holding string having a pearl-shell button to prevent it slipping through the fingers. The slip string was finished with a taper point which cracked like a whip on release.[21] At the end of the nineteenth century it was still in use in parts of the American continent, and Spanish herdsmen of South America were said to be so dextrous with the sling that they could hit a bullock on either horn in order to guide it.[22] This custom seems to be fairly common. Lindblom[23] quotes several instances of this occurring in Minorca (with bulls), North Africa (sheep and goats), and Tibet (yaks). The Riffian herdsmen could sling stones for this purpose to a distance of about 200 m. So confident were the Arab Bedouins of their skill that they have been known to attack a lion at long range with a sling from horseback, adroitly keeping out of the way of the enraged animal until a lucky hit on the head killed the beast. According to the same author, however, the sling is now used in Africa mainly as an implement to scare birds off crops.

In Ceylon the sling is still used to drive off larger marauders—wild elephants and buffalo—from crops. Known as the *gal patiya* (stone strap) or the *gähi lanuwa* (hitting string) it is made of woven bark or fibre and has cords about 3 ft. long. Practised slingers themselves spinning round with the sling have attained ranges exceeding 300 yd.[24] This extreme range is also said to have been reached by the Tibetans, who also used the sling as a whip.[25]

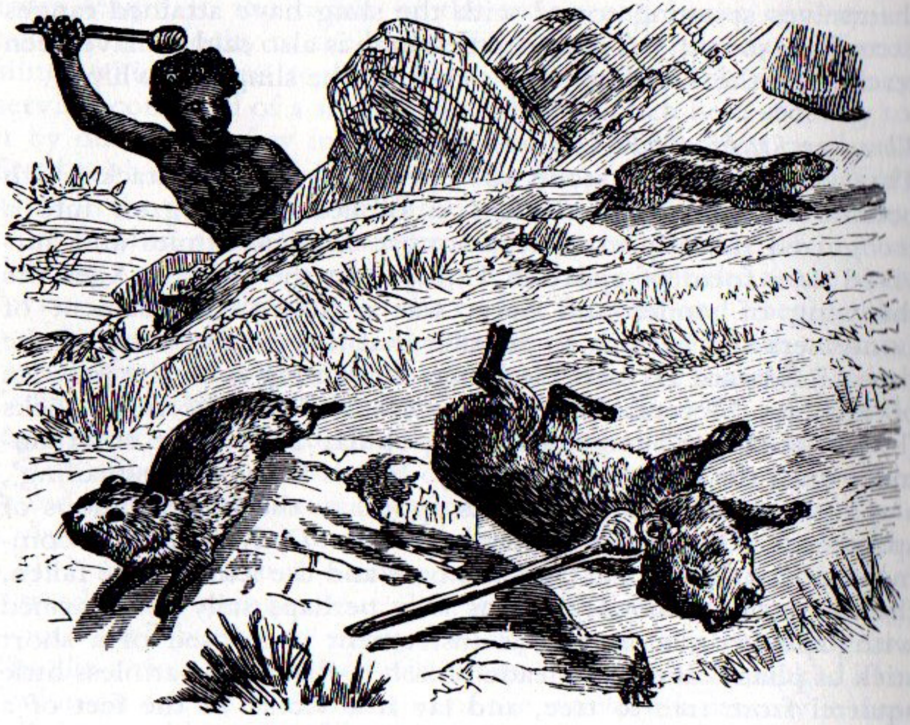
Throwing Sticks, Clubs, and Boomerangs

Throwing a stick or a stone was a primitive form of attack which became a form of punishment in Biblical times, grew into a recognized military exercise amongst classical armies and survived as a form of sport in Europe. In the Middle Ages the throwing of stones and darts was a holiday amusement of Londoners and became so popular that it was suppressed in the time of Edward III because it was interfering with the practice of archery. Nevertheless throwing a stick or stone at cocks (hence 'cock-shy') remained as a popular Shrovetide entertainment until the eighteenth century. It was known as 'squailing', a sport which has never lost its appeal to the less fastidious of sportsmen. On 30 November 1881 the *Daily Telegraph* commented: 'Now that the trees are bare and the leaves have fallen, the idlers of the county towns may perhaps sally forth armed with '*squailers*', an ingenious instrument composed of a short stick of pliant cane and a leaded knob to drive the harmless little squirrel from tree to tree, and lay it a victim at the feet of a successful shot.' Amongst the native races of Africa, Australia, and the Pacific islands the wooden club or stick used as a missile continued as a serious weapon of war and as an effective hunting weapon into the first quarter of this century.

Wooden missiles are of two kinds: the straight club variety generally knobbed at the end which is thrown with a twirling motion and is meant to stun or kill with a blow; and the curved clubs which, when flattened and properly shaped, can be made to return to the thrower in the event of a miss. The straight clubs ranged in length from the 3-ft. long specimens used by some tribes of West Africa to break the limbs of animals at a distance

of only a few paces, down to the vicious *ulas* of Fiji, about 18 in. long with heavy-knobbed heads.

The African *knobkerri* or *runga* was the most popular of the throwing clubs, about 2 ft. long and made of wood with a narrow rod-like handle. Some of the most prized specimens were made of rhinosceros horn. As a hunting weapon it could be



134. Throwing sticks being used against rock rabbits by Kaffir huntsman. From J. G. Wood's *Man and his Handiwork* (1886).

hurled with tremendous force and precision. It was used with great effect by the Kaffirs against the hyrax or rock rabbit (Fig. 134) and against a bird, akin to the quail, known as the *pauw*. Both type of game were stalked by two hunters moving about 50 yd. apart. As they roused the rabbit or bird they threw their kerries in such a way that in dodging one club the quarry would nearly always fall to the other.

The trick of making a throwing missile return to the thrower

was an ancient one. The encyclopedia of Bishop Isidore (A.D. 600–36) defines the *cateia* as 'a species of bat which, when thrown, flies not far by reason of its weight; but when it strikes it breaks through with extreme impetus, and if it be thrown with a skilful hand it returns to him who threw it (*rursum redit ad eum qui misit*)'. Virgil (70–19 B.C.) remarked on the Teutonic method of throwing it:

Et ques maliferae despectant moenia Abellae
Teutonico ritu soliti torquere cateias

(*Æn.*, vii., 740)

The modern word boomerang, strictly speaking, is applicable only to the curved wooden throwing sticks of Australia, but nowadays it is used indiscriminately to denote all curved throwing weapons, flat in section, used either for war or sport, and with or without the ability to return to the thrower. The true boomerang with the return flight works something like a toy propellor launched into the air. If, when the impetus of the forward motion dies down, the wooden blade is still rotating fast enough, it will slip back through the air, often falling behind the thrower. To achieve this effect the boomerang has to be thrown with a violent jerk to impart the necessary spinning motion and this reduces both the accuracy and the violence of the throw. The boomerang with a 'come-back' is, therefore, rarely used for purposes other than fowling or exhibitions. No special shapes, weights, or sizes can be said to constitute the ideal weapon, the choice being very much a matter of individual preference. There are, however, approximate ranges of, in weight, 6–12 oz., in length, 16–30 in., and in width, 2–4 in. The best come-backs rarely exceed $\frac{1}{2}$ in. in thickness. These light boomerangs have been thrown to distances up to 50 yd. The heavier curved throwing sticks, with no pretensions to a return flight, have been known to break the limbs of animals and are said to have a range of 150 yd.

The curved throwing stick, of course, has never been confined to Australia. The Egyptian 'Hunter's Palette' of *c.* 3500 B.C. in the British Museum shows hunters carrying what appears to be boomerangs, and actual examples have been found preserved in tombs at Badari, Egypt, which date back to *c.* 4000 B.C.[26] In sculpture and paintings of later periods the sporting variety of

the stick—it was also used as a fighting weapon—is generally represented in the hands of a fowler standing in his punt amongst the reeds with flocks of wild fowl at a convenient distance. The hunter often employed what appears to be a decoy duck. The ancient Egyptian boomerang was, as a general rule, only slightly

135. An Ancient Egyptian sportsman hunts birds with throwing sticks. Detail from tomb-paintings at Thebes, *c.* 1400 B.C.

curved, sometimes into a gentle S-curve (Fig. 135); but amongst the collection of boomerangs found in Tutankhamen's tomb of *c.* 1350 B.C. were a few acutely-angled specimens. This type survives in the boomerangs called *trombash* still used in Abyssinia and the Upper Nile regions which are sharply curved at one end. In India both wood and iron boomerangs were used in many places. Again, their shapes and sizes vary considerably. In Madras an unusual type called the *kollery* or *katari* was made.

This had a thin flat curved blade terminating in a heavy knob. The *āstara* was also well known in southern India and was employed against deer. Another type with the Tamil name of *valai tade* (bent stick) had a return flight.[27] There is no end to the variety of the boomerang, but one last type may be mentioned because of its strange appearance. When seen in outline, the rabbit stick of the Hopi Indians of North America looks like a sabre in its scabbard.

Blowpipes

In all the hunting weapons so far described the efficacy of the weapon has, in the long run, depended on the strength and dexterity of the hunter's arms and the sureness of his eyes. The blowpipe or blowgun merits some attention because it calls on the power and control of a man's lungs and throat. The weapon works on the same principle as the toy pea-shooter, the elasticity of compressed air being converted into rectilinear motion—but with more deadly effect. In fact, the force and accuracy of the blowpipe when demonstrated invariably amazes the onlooker unacquainted with its powers.

So often only associated with primitive cultures it was known in Europe in the Middle Ages. A French manuscript of *c.* 1320 in the British Museum (Add. MS. 36684, f. 44), shows what appears to be a blowgun being aimed at a rabbit. It can be seen also in the manuscript treatise on rural economy by Pietro de Crescenzi in the Bibliothèque de l'Arsenal, Paris (MS. 5064). This is a copy executed in *c.* 1470 of the original manuscript written in *c.* 1304–6. In another fifteenth-century manuscript of Flemish origin in the Pierpont Morgan Library, New York (MS. 232), an illustration shows fishers with nets and rods, and hunters with boar spear, cranequin crossbow, and blowpipe. The sportsmen carrying the last two weapons are aiming at birds in a tree. There is an interesting reference to the effect of missiles from a blowpipe in Benvenuto Cellini's Autobiography. He describes a hailstorm in 1544: 'This hail was larger than the pellets of a blow-pipe, and when it struck me, it hurt me very much. And little by little this hail began to grow bigger in such fashion that it was like the bullets of a cross bow.'[28] With the great variety of projectile weapons available in Europe there was never any great demand for the blowpipe but it continued to

be made in small numbers as a curiosity. The Historisches Museum, Dresden, contains a small number of iron blowpipes (*Blaurohr*), each made like a Spanish gun barrel with a brass mouthpiece and foresight. They are approximately 5 ft. long and are accompanied by pincer-shaped bullet moulds for producing clay pellets of about ·50 in. (13 mm.) calibre.[29]

In the second half of the nineteenth century, in Britain, the walking stick was in considerable vogue, being made with a variety of built-in accessories like watches, drinking flasks, writing instruments, daggers, and, of course, guns. Some sticks were inevitably hollowed out to act as blow tubes. The following advertisements appeared in *Land and Water* for 1867 and give a good idea of the ranges and targets considered appropriate to the weapon.

THE WALKING STICK BLOW-TUBE

E. LANG, 22 Cockspur-street, London, begs to call attention to his recent improvements in the above Weapon and Missiles used, he having lately received some valuable hints on the subject from an elaborate description of this weapon (as used by the Macoushie Indians), by that celebrated traveller, Mr. Waterton. To this E. LANG has added his own experience, and can now offer a very powerful and accurate Weapon for destroying Vermin, Shooting Birds, &c. Besides the above, when reduced in size, forms with target one of best of indoor amusements for ladies and gentlemen. Tube, 10*s.* 6*d.* and upwards; darts, 4*s.* per dozen; balls, 1*s.* per 100; moulds, 2*s.* 6*d.*; targets, 2*s.*

W. JACKSON, original Blow Tube Manufacturer (with the late T. Cooper, of New Bond-street), 37, BREWER-STREET, W., is now making an improved article at 7*s.*; superior Ebonised and Imitation Malacca, 10*s.* 6*d.* and 12*s.* 6*d.* Blow tubes, as described in the *Field* of May 5 and July 28, pages 365 and 81, are acknowledged the best weapons for killing small birds. W. J. has perfected an improved dart, rigid and impervious to damp, can be blown fifty yards, for killing rooks, pigeons, rabbits, &c., 4*s.* per dozen. Balls, 1*s.* per hundred; Moulds, 2*s.* 6*d.*; Targets, 2*s.* With target and darts it forms a pleasing source of indoor amusement. All orders promptly executed. W.J. has no connection with any other house. Beware of imitations. P.O.O. on Brewer-street. W.

During the Second World War, using an improvised blowpipe, an American reported killing hares at ranges up to 60 yd.[30]

Apart from the blowpipe's appearance in Europe its use elsewhere has been mainly confined to two large areas on either side of the Pacific. One, in Asia, stretches from Ceylon round the Malay Peninsula and Archipelago through to Borneo and New Guinea reaching as far as Japan. The other area is situated in South America, being concentrated in Guiana, Brazil, and Ecuador. From here the weapon has found its way to parts of Mexico and to the Cherokee Indians of the south-eastern areas of the U.S.A. Although these areas are separated by such a large expanse of ocean there is a marked resemblance between the different types of blowpipes found in both areas which suggests a common origin. Anthony Pigafetta sailing with Magellan in 1521 reported seeing blowpipes fitted with lance heads in the Phillipine Islands,[31] and W. M. Stirling, in his survey of the Jivaro Indians of the Upper Amazon, has suggested that the blowpipe may have been brought to South America by captive Phillipine islanders escaping from the Spanish galleons following a route across the Pacific.[32] The blowpipe has also been noted in Madagascar, which also lies on the old trade route.

Native blowpipes can be divided into three groups according to the manner in which they are constructed: (*a*) bored from a single piece of wood or bamboo; (*b*) made of two longitudinal sections each grooved so that when fitted together a tube is formed; and (*c*) formed by two hollow reeds or canes, one inserted in the other.

In the first group are the *balasan* of Sumatra, the *kahuk* of Timor, the *tulup* of Java, and the *poeot* and *sumpitan* of Borneo. Basically they are of the same construction, being bored out of a solid piece of wood or cane; but they vary considerably in size and in detail. The *tulup* is a light blowpipe about 5 ft. long and is sometimes made of two pieces of bamboo joined together. The *sumpitan*, the best known of the Borneo group, is a heavy weapon from 6–8 ft. long with a blade lashed to its muzzle so that it can be used as a spear if necessary (Fig. 136). It is constructed from the hard, straight-grained wood of the Jagang tree, the boring operation being carried out in the following primitive fashion:

Having chosen and felled the tree, often one of large size, the craftsman splits from it pieces about eight feet in length. Such a piece is shaved with the adze until it is roughly cylindrical and three to four inches in diameter. The piece may be carried home to be worked at leisure, or the boring may be done on the spot. A platform is erected

about seven feet from the ground; and the prepared rod is fixed vertically with the upper end projecting through the platform, its lower end resting on the ground. Its upper end is lashed to the platform, its lower end to a pair of stout poles lashed horizontally to trees, and its middle to another pair of poles similarly fixed.

The next operation, the boring of the wood, is accomplished by the aid of a straight rod of iron about nine feet long, of slightly smaller diameter than the bore desired for the pipe, and having one end chisel-shaped and sharpened. One man standing on the platform holds the iron rod vertically above the end of the wood, and brings its sharp chisel edge down upon the centre of the flat surface. Lifting the rod with both hands he repeats the blow again and again, slightly turning the rod at each blow. He is aided in keeping the rod truly vertical by two or three forked sticks fixed horizontally at different levels above the platform in such a way that the vertical rod slips up and down in the forks, which thus serve as guides. The rod soon bites its way into the wood. An assistant, squatting on the platform with a bark-bucket of water beside him, ladles the water into the hole after every two or three strokes, and thus causes the chips to float out. This operation steadily pursued for about six hours completes the boring. In boring the lower part the craftsman aims at producing a slight curvature of the tube by slightly bending the pole and lashing it in the bent position; the pole on being released then straightens itself, and at the same time produces the desired curvature of the bore. This curvature is necessary in order to allow for the bending of the blow pipe, when in use, by the weight of the spear blade which is lashed on bayonet-fashion. . . . It only remains to whittle down the surface to a smooth cylinder slightly tapering towards the muzzle, to polish the pipe inside and out, to lash on the spear-blade to the muzzle end with strips of rattan, and to attach a small wooden sight to the muzzle end opposite the spear-blade.[33]

The weapon when complete has a bore of about $\frac{1}{2}$ in. and an outside diameter of just over 1 in. The darts are the size of a knitting-needle, from 6–9 in. long and from an $\frac{1}{8}$–$\frac{1}{16}$ in. in diameter. A pith cone is fastened to the base so that this accurately fits the bore of the tube. Being extremely light the darts have little penetration and in themselves are harmless. They rely for their effect on the power of the poison *ipoh* which is prepared from the juices of the Ipoh or Upas tree and from the roots of the Ipoh creeper (*Strychnos tiente*), mixed with other obnoxious substances. For safety these darts are carried in a bamboo quiver with a tight-fitting cover. In a test of their skill with these darts, Borneo head hunters put six out of ten into a potato at a distance of 50 paces. They insisted that, with a properly prepared dart, weighted and heavily poisoned, they could kill a rhinoceros.[34]

In the second group, which is rarely found in the Malay Peninsula, the outstanding example of the blowpipe is the heavy *zarabatana* of the Indian tribes of Guiana and Peru, about 7 ft. long and weighing from 3–4 lb. In all these specimens a palm stem or reed is split longitudinally, the inside removed and carefully grooved, and then the two halves are bound together with spiral wrappings. To make certain there is no escape of air the tube is covered with a layer of some wax or bituminous substance and a trumpet-like wood or bone mouthpiece is added. A more substantial dart is used, being furnished with an iron head and a conically-twisted piece of bark as a base plug (Fig. 136). The poison is prepared mainly from the wourali vine (*Strychnos toxifera*) and is carried in an airtight tube, as it deteriorates on exposure to moisture.

In the same group is the Japanese blowpipe *fukidake* or *fukizutsu*. Although over 9 ft. in length it is very light, being made from two pieces of light wood bound together with layers of paper called *minogame*. The dart is a sliver of bamboo with paper feathers. The Japanese also made a blowpipe bored from a single piece of cane about 5 ft. long which has an extraordinary mouthpiece projecting from the side a few inches from the breech. After the dart is inserted, the breech is closed with the end of a crook handle. With this design there was no fear of the poison contaminating the mouthpiece.

Examples of the third group are found on both sides of the Pacific. The *kina* of Sumatra is composed of two tubes of the *Bambusa longinodis* one inside the other. The best example of this kind of construction, however, is the *pucuna* of Guiana. It is the longest of all the blowpipes sometimes exceeding 11 ft., but it only weighs approximately $1\frac{1}{2}$ lb. The inner tube is made from the reed, *Arundinaria schomburghii*, which grows naturally with a uniform thickness. As the walls of this reed are very thin it is strengthened by being inserted into a length of the palm known as the *Samourah*. The interstices between the two reeds are filled with wax; the muzzle is protected by a cylinder of the *Aquiro* nut, and a wooden mouthpiece is fitted to the breech. A final touch is the addition of two incisor teeth of the Acouri rodent to

act as a rear sight. The darts, about 9 in. long, are made from the leaf-stem of the concourite palm, padded with cotton at the base (Fig. 136), and are carried in a most ingenious manner. They are

136. *Left*: A Borneo hunter armed with his *sumpitan* blowpipe fitted with a spear blade. *Right*: The Guiana *zarabatana* dart with a base of coiled bark and two *pucuna* darts, the bases padded with cotton.

threaded, like the rungs of a rope ladder, through two strings and are then rolled up round a stick with a wooden disc at the top to protect the brittle points. The quiver is of closely-woven reed coated with Kurumanni wax.

The blowpipe was a weapon intended for work in the confines of the jungle where its flight would not be disturbed by a puff of wind. Birds and monkeys were its main prey, normally shot within a distance of 50–60 yd. Carefully loaded and blown, however, the blowpipe could be used up to nearly 150 yd.[35]

In south India two interesting varieties of blowpipes were used. One, used by the Malayali, shot a miniature harpoon with a barbed metal point fitting loosely on the wooden shaft and connected to it by a cord carefully wound spirally round the length of the shaft. The cord ended in a mop-like tuft which served as a wad. This was for shooting fish in streams and back waters. The other blowpipe, used by the Kadars and Muhammadans, shot a clay pellet known as *kalimannu gundu* (black-earth ball) at birds. To expel the pellet with sufficient force to stun a bird required the expenditure of considerable force and a range of 40 ft. appears to have been the limit.[36]

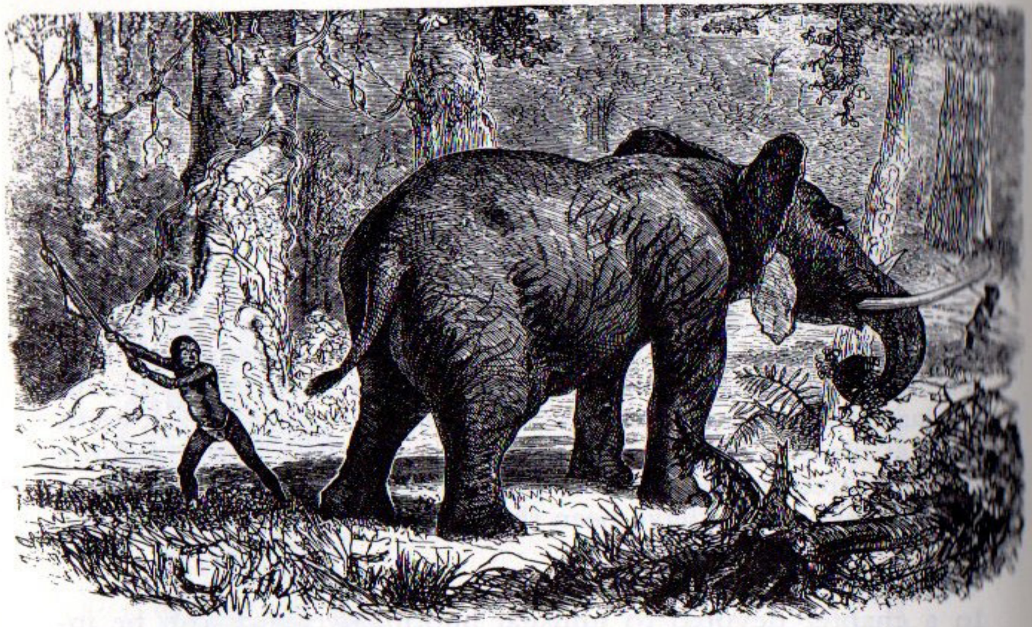
The Elephant Axe

In a chapter devoted to unusual hunting weapons can be included a description of the method adopted by certain courageous tribes of Central Africa to kill or disable an elephant (Fig. 137). This was done with the aid of a large axe with a handle 6–7 ft. long, as follows:

two hunters start off in search of an elephant with good tusks one of them carrying the axe and the other nothing except, perhaps, a stick or a spear. When they have found an elephant worthy of their skill, they separate widely, the axe-man keeping behind the elephant and entirely out of sight, while the other is well ahead.

At a preconceived signal, the spear-man begins to agitate the bushes, so as to draw the elephant's attention, while every now and then he shows himself for a moment, so as to puzzle the animal and make him undecided whether he shall attack or retreat.

While this by-play is going on, the axe-man steals up silently behind the animal, and when he is within reach deals a blow at the back sinew (Achilles tendon) of the hind leg, which, in the elephant, is within a few inches of the ground. The animal is then powerless. An elephant requires all its legs and is not, like many animals, able to charge on three legs if one is disabled. Sometimes the tendon is not quite severed by the blow. This is, however, of little consequence, as, owing to the vast bulk of the animals the tendon is sure to snap as soon as the weight is thrown on it.[37]



137. Hamstringing an elephant. Note the other hunter in front acting as a decoy. From the *Travels of Dr. Livingstone*.

It was a very old method of hunting for Stradanus gives an engraving of such an incident in his *Venationes* of 1578. The artist, who had to rely on travellers' tales for his information, added a note that the hunters were troglodytes or cave dwellers 'who are expert at snaring elephants, grasp their tails, hamstring the beasts and kill them when thus maimed'. The French engraver, Etienne Delaune (1519–83), in a print of wild men fighting all kinds of animals, shows one man with an axe in his belt on the back of a remarkably docile elephant holding his tail and intent on performing the same trick.

Notes

INTRODUCTION

1 Amongst 'The Profits and Advantages of the Stag', Blome, in *The Gentlemans Recreation* (1686), listed '. . . his *Pizzle* or *Genital Member* washt in Water, and that Water being drank, doth immediately ease and cure the *Collick, stoppage* of the *Urine*, and several *Maladies* incidental to the *Reins*, Kidneys, and *Uriters*; It is a notable *Aphrodisiac*, and used for that purpose.'

2 *Let. Pap. Hen. VIII*, Vol. III, Pt. 1, p. 450.

3 E. Lodge, *Illustrations of British History*, etc. (London, 1791), Vol. III, p. 245.

4 *Ibid.*, p. 335. Mawe was an old game of cards played with a piquet pack of thirty-six cards.

5 W. A. Baillie-Grohman, *Sport in Art* (London, 1919), p. 241.

6 *Ibid.*, pp. 185–6.

7 *Wrinkles; or, Hints to Sportsmen and Travellers* (London, 1874), pp. 228–9.

8 E. D. Cumming (ed.), *Squire Osbaldeston: His Autobiography* (London, 1926), p. 75.

9 *Ibid.*, p. 85.

10 *See* M. Thiebaux, 'The Noble Art of Venery', *The Saturday Book* (1966), pp. 130–46; J. Aymard, *Essai sur les Chasses Romaines* (Paris, 1951), pp. 129–38 (section on 'La Chasse Littérarie des Erotica').

11 A poem of *c.* 1680 entitled 'On retiring to live in the country', begins:

If I live to grow old for I find I go down
Let this be my fate. In a country town
May I have a warm house, with a stone at the gate
And a cleanly young girl to rub my bald pate.

Anon.

SWORDS

1 A good example is the pebble mosaic at the ancient Greek city of Pella in Macedonia.

2 See W. Ginters, *Das Schwert der Skythen und Sarmaten in Südrussland* (Berlin 1928), Pl. 34.

3 Library of Christ Church, Oxford, MS. 92.

4 W. A. Baillie-Grohman, 'Ancient Weapons of the Chase', *Burlington Magazine* (1903), Pt. II, p. 164.

5 V. Gay, *Glossaire Archéologique* (Paris, 1887), Vol. I, p. 644.

[6] See B. Thomas, 'Kejser Maximilian I'stre Pragtsvaerd i Wien og København', *Vaabenhistoriske Aarbøger*, Vol. VI b–c (1950–51), pp. 105–84.

[7] See R. Bohlmann, 'Von Jagd-, Schwein- und Landsknecht-schwerter', *Zeitschrift für Historische Waffenkunde*, Vol. XIV (1935–6), pp. 117–21. The Berlin sword was purchased from the Hans Leiden Sale (Cologne, 1934, Lot No. 295) and is illustrated in the *Katalog*, Pl. 20.

[8] A. Neuhaus, *Deutsche Jagd-Altertümer* (Nuremberg, 1935), Pl. 1.

[9] F. H. Cripps-Day, 'An Inventory of the Armour of Charles V', *Fragmenta Armamentaria*, Vol. II, Pt. 5 (1951), p. 63.

[10] *Let. Pap. Hen. VIII*, Vol. I, Pt. 2. p. 1443.

[11] H. A. Dillon, 'Arms and Armour at Westminster, the Tower, and Greenwich 1547', *Archaeologia*, Vol. LI (1888), pp. 244, 268.

[12] B. M., Harl. MS. 1419B, f. 410v.

[13] J. G. Mann, 'The Lost Armoury of the Gonzagas', *Arch. Journ.* Vol. XCV, (1939), p. 313, No. 334.

[14] The project came to an end in 1519 when the Emperor died and the first edition of the *Triumph* was not published until 1526.

[15] See A. Diener-Schönberg, 'Knebel an Jagdblankwaffen', *Z.H.W.K.*, Vol. III (1902–5), pp. 345–57.

[16] L. G. Boccia, *Nove Secoli di Armi da Caccia* (Florence, 1967), p. 92.

[17] Mann, *Arch. Journ.*, Vol. XCV (1939), p. 57, No. 59.

[18] See A. Neuhaus, *Deutsche Jagd-Altertümer* (Nuremberg, 1935), Pl. 7.

[19] See W. Muschg, *Die Schweizer Bilderchroniken* (Zürich, 1941), Pl. 64.

[20] E. Haenel, *Kostbare Waffen aus der Dresdner Rüstkammer* (Leipzig, 1923), Pl. 32.

[21] Sold at Fischers Sale, Lucern, 1932, Lot 5.

[22] See C. Blair, 'A royal swordsmith and damascener: Diego de Çaias', *Metropolitan Museum Journal*, Vol. III (1970), New York, 1971, pp. 149–198.

[23] Blair, *op. cit.*

[24] *Archaeologia*, Vol. LI (1888), p. 272.

[25] *Let. Pap. Hen. VIII*, Vol. XIII, Pt. II, p. 500.

[26] C. Blair, 'A Royal Cutler's Bill of 1547', *Journ. Arms & Armour Soc.*, Vol. I (1953–5), pp. 104–11.

[27] Surtees Society, *Testamenta Eboracensia* (1836), Pt. 1, L. 1.

[28] H. Dillon, 'On Some of the Smaller Weapons of the Middle Ages', *The Reliquary*, Vol. I (N.S.) (1887), p. 4.

[29] *Let. Pap. Hen. VIII*, Vol. V, p. 328.

[30] *London Consistory Court Wills, 1492–1547*, London Record Society (1967), p. 38.

[31] British Museum, Lansdowne MS. 118, ff. 53v–55.

[32] W. A. Baillie-Grohman, *Sport in Art* (London, 1919), pp. 110–11.

[33] See F. Grose, *The Antiquarian Repertory* (London, 1807), Vol. I, pp. 1–2.

[34] A knife, fork, and spoon of 1579 in the Historisches Museum, Dresden, have similar handles. See W. von Seidlitz, *Die Kunst in Dresden* (Dresden, 1921), Pl. 57.

[35] *Let. Pap. Hen. VIII*, Vol. V, p. 329.

[36] See I. Grabowska, 'Trzy Okazy Renesansowej Broni Mysliwskiej Z Dekoracja Trawiona', *Studia I Materialy Do Dziejow Dawnego Uzbrojenia I Ubiora Wojskowego*, Vol. IV (1969), pp. 25–53.

[37] See H. Seiler, 'Klingenätzungen des Ambrosius Gemlich', *Z.H.W.K.*, Vol. XVI (1940–2), pp. 11–19.

[38] In the Doge's Palace, Venice, the blade of an estoc is formed by the long barrel of a wheel-lock pistol. The point has to be detached before firing. See also G. Hiltl, *Waffensammlung Carl von Preussen* (Berlin, 1877), Pl. 44.

[39] B.M., Harl. MS. 1419B, f. 412.

[40] *Catalogue of an Exhibition of Arms, Armour and Militaria* (Tower of London, 1952), No. 70.

[41] E. His, *Dessins d'Ornements de Hans Holbein* (Paris, 1886).

[42] Victoria and Albert Museum. No. E. 1794–1929. See J. Hayward, *Swords and Daggers* (London, 1963), Pl. 40.

[43] See A. Hoff, H. D. Schepelern, and G. Boesen, *Royal Arms at Rosenborg* (Copenhagen, 1956).

[44] Dresden No. M 263–65.

[45] Erna v. Watzdorf, 'Kursächsische Jagdwaffen von Gabriel Gipfel in der Dresdner Rüstkammer', *Z.H.W.K.*, Vol. XIV (1935–6), pp. 4–14.

[46] Bills and accounts of the Bavarian cutlers and decorators were published by Hans Stöcklein in *Meister des Eisenschnittes* (Esslingen a N., 1922).

[47] E. Lodge, *Illustrations of British History*, etc. (London, 1791), Vol. III, p. 247.

[48] Public Record Office, London, L.C. 9/94, f. 20.

[49] P.R.O., L.C. 9/96.

[50] See C. H. Read, *The Waddesdon Bequest* (London, 1902), fig. 34, and W. Baillie-Grohman, *Sport in Art* (London, 1919), p. 196.

[51] G. Hiltl, *Waffensammlung Carl von Preussen* (Berlin, 1877), Pl. 6.

[52] G. E. and K. R. Fussell, *The English Countryman* (London, 1955), p. 99.

[53] This statement was made in a later petition and it is possible that cutlers were already at work at Hounslow before this date.

[54] In 1679 a Thomas Halpenny advertised in the *London Gazette* the loss of 'a Hanger, with a Sawe on the back, hatch't with silver'.

55 One sword of this type in the London Museum (No. 36/155/2) is dated 1634 and another (No. 36/154/5) is signed ME FECIT HOUNSLOW.

56 *A Proclamation prohibiting the making up of Girdles, Belts, Hangers, and other wares for mens wearing, or for Warre-service, with Brasse-Buckles.*

57 Guildhall Library, London. Cutlers Minute Books, MS. 7151/1, f. 376r.

58 H. L. Blackmore, *British Military Firearms* (London, 1961), p. 31.

59 A bill dated 30 April 1686 from Peter English to the Ordnance refers to 'Basket Hilted Swords with *pewter* handles'. P.R.O., W.O. 51/32, p. 101.

60 G. I. Mungeam, 'Some Notes on London-made Sword Hilts of the Seventeenth Century', *J.A.A.S.*, Vol. VI (September 1969), pp. 209–13.

61 *A Handbook of Court and Hunting Swords, 1660–1820* (London, 1937), fig. 43. Here it is wrongly attributed to German origin.

62 The unusual knuckle-bow motif consisting of a bandsman playing a flute, on a small sword in the Tower of London Armouries (No. IX-686) has been seen on a hanger and a cavalry sword in a private collection.

63 On some swords the cups appear to be of brass covered with silver plate.

64 J. Drummond, *Ancient Scottish Weapons* (Edinburgh, 1881), Pl. 55, No. 6.

65 *A Series of Historical Portraits Selected From The National Portrait Exhibition of 1866* (London, 1866), No. 933.

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71 See P. G. W. Annis, *Naval Swords* (London, 1970), pp. 24–5, 28–9.

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73 *The Gentlemans Recreation* (London, 1686), p. 84. The ceremony is illustrated in a plate between pages 84–5 called 'Stagg Hunting Viz Choping at his head'.

74 Desiderius Erasmus, *Moriae Encomium or A Panegyrick upon Folly* (London, 1709), pp. 65–6.

75 See E. Lutze, *Fürstliches Jagen* (Frankfurt (n.d.)). This series of six large canvases was originally painted for a room in the hunting lodge at Wabern bei Kassel, but is now in Schloss Fasanerie, near Fulda.

76 *Katalog Deutsches Jagdmuseum* (Munich, 1966), p. 171.

77 Bashford Dean, *Catalogue of European Court Swords and Hunting Swords* (New York, 1929), p. 65.

78 G. de Bellaigue and A. V. B. Norman, 'An eighteenth-century French pattern book, *The Connoisseur* (September 1964), pp. 16–20.

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81 An outstanding early example is the Ancient Egyptian flint knife with a carved ivory handle from Djebel-el-Arak now in the Musée du Louvre, Paris. See M. Carrà, *Ivories of the West* (London, 1970), Pl. 4.

82 S. Jenyns, 'The Chinese Rhinoceros and Chinese Carvings in Rhinoceros Horn', *Trans. Oriental Ceramic Soc.*, Vol. 29 (1954–5), pp. 41, 49.

83 *Royal Arms at Rosenborg*, pp. 62, 70.

84 The parish registers of St. Giles without Cripplegate, London, from c. 1600 onwards, contain a number of entries relating to lapidaries, diamond cutters, and jewellers. In 1628 James Maes, an apprentice of Robert South, the royal sword cutler, was turned over to Conrad Peeters, jeweller and stone cutter of London and duly became a Freeman of the Cutlers Company in 1635.

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88 E. Haenel, *Kostbare Waffen aus der Dresdner Rüstkammer* (Leipzig, 1923), p. 130, Pl. 65d.

89 J. F. Hayward, 'The Imperial Russian Arms Factory at Tula', *Apollo*, (1949), pp. 43–5, 69–71.

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94 W. Rose, 'Die Klingenmarke 1414 (1441) und verwandte Zahlenmarken', *Z.H.W.K.*, Vol. XIV (1935–6), p. 131.

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[18] Latham and Paterson, pp. 145–51.

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[21] Klopsteg, pp. 59–67; Faris and Elmer, pp. 174–5; Latham and Paterson, pp. 106–7.

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[23] Faris and Elmer, pp. 120–1.

[24] N. M. Penzer (ed.), *Sir John Chardin's Travels in Persia* (London, 1927), pp. 198–9.

[25] A. S. Beveridge, *The Memoirs of Bābur* (London, 1912), Vol. I, App. C.

[26] Faris and Elmer, pp. 148–9.

[27] Faris and Elmer, pp. 136–7.

[28] Latham and Paterson, pp. 139–40, 207; Faris and Elmer, pp. 140–1.

[29] See the illustrations of archers' equipments in S. von Herberstein, *Gratiae Posteritati Sigismundus Liber Baro in Herberstein actiones suus reliquit*, etc. (Vienna, 1560).

[30] *The Four Epistles of A. G. Busbequius* (London, 1694), pp. 206–7.

[31] Klopsteg, pp. 22–32.

[32] *A Summary of the History, Construction and Effects in Warfare of the Projectile-Throwing Engines of the Ancients* (London, 1907), p. 21. In 1967 the American archer Harry Drake shot 852 yd. with a hand bow. The previous year using a foot bow, and lying on his back, he had reached 1,071 yd.

[33] The 1542 and 1543 inventories of the Armoury of the Gonzaga family at Mantua include several Turkish bows ('*archi alla turchescha*') and quivers. See J. G. Mann, 'The Lost Armoury of the Gonzagas', *Arch. Journ.*, Vol. XCV (1939); *Ibid.*, C (1945).

[34] E. T. C. Werner, *Chinese Weapons* (Shanghai, 1932), pp. 15–23.

[35] Gad Rausing, *The Bow* (Lund, 1967), pp. 112–19.

[36] The birch tree (*Betula japonica*), known as *hua* in China, grows abundantly in the north and west provinces. The bark was used not only on the grips of bows but on the handles of knives and the poles of spears. An extremely thin variety was employed as the inside lining of scabbards of swords and knives.

[37] E-tu Zen Sun and Shiou-Chuan Sun (trans.), Pennsylvania State University Press, 1966, pp. 262–3.

[38] Stone (*Glossary*, p. 134) classifies military bows in four sizes of 70, 80, 90 and 100 lb. pull, but had also seen a huge bow in Peking with a 200-lb pull.

[39] *Bows and Arrows* (Berkeley and Los Angeles, 1962), pp. 23–4. Pope also handled a much heavier Chinese bow which he had difficulty in bracing and drawing. Payne Gallwey asserted that one of these strong bows using a 36-in. arrow shot up to 260 yd. (see *Projectile-Throwing Engines* (London, 1907), Treatise on Turkish Bows, p. 18).

[40] E. C. Bridgman, *Chinese Chrestomathy* (Macao, 1841), pp. 366–8.

[41] See Soame Jenyns, *Chinese Archaic Jades in the British Museum*, (London, 1951), Pl. 33 (c).

[42] A set of royal tablets of the Emperor Hui Tsung in the British Museum includes one. See J. P. Palmer, *Jade* (London, 1967), Pl. 16.

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[44] Jiro Harada, *English Catalogue of Treasures of the Imperial Repository Shōsōin* (Tokyo, 1932), Nos. 301–2, 640.

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[46] Stone, *Glossary*, fig. 872.

[47] See E. Gilbertson, 'Japanese Archery and Archers', *Trans. Japan Soc.*, Vol. IV (1895–8), pp. 112–26.

[48] C. B. Edwards and E. G. Heath, *In Pursuit of Archery* (London, 1962), pp. 26–7.

[49] G. Rausing, *The Bow* (Lund, 1967), pp. 44, 61.

[50] *The Itinerary Through Wales* (London, 1908), pp. 49–50.

[51] J. G. Edwards (ed.), *Littere Wallie* (Cardiff, 1940), front.

[52] *Antiquaries Journal*, Vol. XXIII (1943), pp. 54–5.

[53] B.M., Add. MS. 47680.

[54] Christ Church, Oxford, MS. 92.

[55] Randle Holm in the seventeenth-century *The Academy of Armory* (1905 edit., p. 117), calls these knots the 'Warrants . . . which are left strong there, for the securing of it'.

[56] Trinity College Library, Cambridge, MS. R.17.1, f. 66r.

[57] R. S. Surtees, *History and Antiquities of Durham* (London, 1816–40), Vol. II, p. 381.

[58] E. S. Morse, 'Ancient and Modern Methods of Arrow Release', *Bull. Essex Inst.*, Vol. XVII (1885), pp. 3–56.

[59] Free translations of the original French taken from G. A. Hansard, *The Book of Archery* (London, 1840), pp. 211–22; and W. A. Baillie-Grohman, 'Ancient Weapons of the Chase', *Burlington Magazine* (1903), Pt. I, pp. 185–94.

[60] *Cal. Close Rolls*, 20 March 1337, 18 April 1341, 23 July 1341.

[61] *Cal. Inquisition Misc.* Vol. VI (1392–9), p. 177.

[62] *Archery* (Badminton Library), pp. 128–9.

[63] 'Brasell, Turkiewood, Fusticke, Sugercheste, Hardbeame, Byrche, Asshe, Ooke, Seruis tree, Hulder, Blackthorne, Beche, Elder, Aspe, Salon.' See also J. E. Oxley, *The Fletchers and Longbowstringmakers of London* (London, 1968), App. V.

[64] B.M., Add. MS. 47680, f. 6v. See W. O. Hassall, *The Holkham Bible Picture Book* (London, 1954), p. 70.

[123] Steel bows are mentioned in *Job* xx, 24 and *Psalms* xviii, 34.

[124] English Reprints Edit., 1902, p. 112.

[125] Soc. of Ant., London, Brander MS. 129, f. 429v.

[126] J. G. Mann, 'The Lost Armoury of the Gonzagas, Pt. II', *Arch. Journ.*, Vol. C (1945), p. 83, No. 346.

[127] *Cal. S.P. Dom., 1581–90*, p. 51.

[128] *Engraved Illustrations of Antient Arms and Armour from the collection of Goodrich Court* (Oxford, 1830), Vol. II, Pl. 92, fig. 10.

[129] C. Purdon Clarke, *Arms and Armour at Sandringham* (London, 1910), Nos. 44, 98, 152.

CROSSBOWS

[1] O. Karlbeck, *Catalogue of the Collections of Chinese and Korean Bronzes at Hallwyl House, Stockholm* (Stockholm, 1938).

[2] W. F. Paterson, 'Chinese Crossbow Lock', *Journ. Soc. Arch. Ant.*, No. 11 (1968), pp. 124–7.

[3] See H. Horwitz, 'Die Armbrust in Ostasien', *Z.H.W.K.*, Vol. VII (1915–17), pp. 155–83.

[4] C. M. Wilbur, 'The History of the Crossbow', *Annual Report of the Smithsonian Institution, 1936* (Washington, 1937).

[5] E. W. Marsden, *Greek and Roman Artillery* (Oxford, 1969), pp. 5–12.

[6] *Arriani Ars Tactica* (Amsterdam, 1683).

[7] See P. L. Duchartre, *Histoire des Armes de Chasse*, (Paris, 1955), p. 109, fig. 86.

[8] The biography (*Gesta Guillelmi ducis Normannorum et regis Anglorum*) and the poem (*Carmen de Hastingae proelio*) are printed in J. A. Giles, *Scriptores Rerum Gestarum Willelmi Conquestoris* (London, 1845), the crossbowmen being mentioned on pp. 37, 132.

[9] '*Odo Balistarius* has three houses of *Forne* and *Orme*, and one of *Elaf*, at a rent, and one church.' Rev. W. Bawden, *Dom Boc, A Translation of the Record called Domesday, so far as relates to the County of York*, etc. (Doncaster, 1809), p. 4.

[10] See D. Talbot Rice, *A Concise History of Painting from Prehistory to the Thirteenth Century* (London, 1967), p. 213.

[11] E. R. A. Sewter (trans.), *The Alexiad of Anna Comnena* (London, 1969), pp. 316–17, n. 36. See also W. Rose, 'Anna Komnena uber die Bewaffnung der Kreuzfaher', *Z.H.W.K.*, Vol. IX (1921), pp. 1–10. The translation makes better sense if the word 'stock' is substituted for 'string' in lines 10 and 11.

[12] J. Hewitt, *Ancient Armour and Weapons in Europe* (Oxford and London, 1855–60),Vol. I, p. 158.

[13] Bürgerbibliothek, Bern, Codex 120; Spanish Bible in Amiens Public Library (MS. 108 f. 124).

[14] Bodleian Library, Oxford. Huntingdon MS. 264. See C. Cahen, 'Un traité d'armurerie composé pour Saladin', *Bulletin d'Etudes Orientales de l'Institut Français de Damas*, Beirut, 1947–8.

[15] *Catalogue of the Antiquities in the Museum at Devizes*, II (1911), p. 57, Pl. 29.

[16] R. Munro, *Ancient Scottish Lake-dwellings or Crannogs* (Edinburgh, 1882), p. 217, Fig. 216.

[17] J. Alm, 'Europeiska Armborst', *Vaabenhistoriske Aarbøger*, Vol. Vb (1947), pp. 108–114, Figs. 1 and 5.

[18] On one crossbow depicted (Fig. 72) the cord appears to be resting in the groove of a revolving nut; on the other the lines of a nut are missing but what appears to be a hole coloured to match the under lever can be seen in the stock in its place. See Egon Harmuth, 'Die Armbrustbilder des Haimo von Auxerre', *Waffen und Kostümkunde* (1970), pp. 127–30. The painting is reproduced in colour in F. R. Donovan, *The Vikings* (London, 1964), pp. 34–5.

[19] Latham and Paterson, *Saracen Archery*, p. 8.

[20] *Cal. Close Rolls, 1227–31*, pp. 217, 312, etc. See also R. E. Latham, *Revised Medieval Latin Word-List* (London, 1965).

[21] *Rotuli Litterarum Clausarum* (London, 1833), p. 44.

[22] *Op. cit.* pp. 511–12.

[23] A. Demmin, *An Illustrated History of Arms and Armour* (London, 1894), p. 475.

[24] Le Comte de Quatrebarbes, *Oeuvres complètes du Roi René*, (Angers, 1845), Vol. I, Pt. 1, p. cxi, n. 2.

[25] Baron de Cosson, 'The Crossbow of Ulrich V Count of Wurtemburg, 1460, with remarks on its construction', *Archaeologia*, Vol. LIII (1892), pp. 445–65.

[26] *Cal. Liberate Rolls, 1226–40*, p. 444.

[27] de Cosson, *op. cit.*, pp. 447–8.

[28] *Cal. Liberate Rolls, 1226–40*, p. 5.

[29] *Ibid.*, p. 31. In 1326–7 Nicholas Ayot gave the King as a fee a spindle full of coarse thread (*unum fusillum plenum filo crudo*) to make a false cord for his crossbow (*Cal. Mem. Rolls, 1326–7*, p. 157).

[30] *Cal. Mem. Rolls, 1326–7*, pp. 362–3.

[31] *Cal. Pat. Rolls, 1334–8*, p. 523.

[32] Marsden, *Greek & Roman Artillery*, pp. 87–8, 110.

[33] *Cal. Liberate Rolls, 1226–40*, Vol. I, p. 383.

[34] W. A. Baillie-Grohman, 'Ancient Weapons of the Chase', *Burlington Magazine* (1903), p. 194.

[35] *Cal. Inq. Misc., 1392–9*, Vol. VI, p. 113.

[36] A visitor to Dover Castle in 1659 reported seeing 'Crosbowes, long Bowes, and Arrowes to the same (to which was fastened Brass instead of feathers) . . .' (R. Kilburne, *A Topographie or Survey of the County of Kent* (London, 1659)).

[37] C. E. Hart, *Royal Forest* (Oxford, 1966), App. V.

[38] See Hewitt, *Ancient Armour*, Vol. I, p. 326, and Latham, *Revised Medieval Latin Word-List*, under 'ballista'.

[39] W. Giese, *Waffen nach der Spanischen Literatur des 12. und 13 Jahrhunderts* (Hamburg, 1925), p. 76.

[40] Latham, *Word-List*, p. 455. Hewitt, *Ancient Armour*, Vol. I, p. 326.

[41] F. Devon, *Issues of the Exchequer* (London, 1837), p. 119. A reference is also made to 'crossbows of three feet' at 8*s*. each.

[42] British Museum, Add. MS. 42130, f. 56. See H. L. Blackmore, *Arms and Armour* (London, 1965), p. 17.

[43] B. M., Royal MS. 2 B VII, f. 162v.

[44] See E. Wagner, Z. Probna, and J. Purdik, *Medieval Costume, Armour and Weapons* (London, 1958), Vol. VI, p. 6.

[45] Gay (*Glossaire*, Vol. I, p. 42) gives a reference in 1313 to '*une arbaleste d'acier dorée*.

[46] N. Davis (ed.), *The Paston Letters* (Oxford, 1958), p. 71.

[47] Gay, *Glossaire*, Vol. I, p. 50.

[48] W. A. Baillie-Grohman, *Sport in the Alps* (London, 1896), p. 8.

[49] W. A. Baillie-Grohman, 'Ancient Weapons of the Chase', *Burlington Magazine* (1903), p. 189.

[50] Facsimile edition, Düsseldorf, 1967.

[51] A. H. Thomas (ed.), *Calendar of Select Pleas and Memoranda of the City of London, 1381–1412* (Cambridge, 1932), p. 209.

[52] *Archaeologia*, Vol. XXI (1826), p. 270.

[53] See M. R. James, *The Treatise of Walter de Milemete* (London, 1913), pp. 136–7.

[54] W. Gohlke, 'Das Geschutzwesen des Altertums und des Mittelalters', *Z.H.W.K.*, Vol. V (1909–11), pp. 354–63. E. Harmuth, 'Eine Ziehbank in Tirol', *Waffen- und Kostümkunde*, Vol. XI (1969), pp. 33–6.

[55] *Let. Pap. Hen. VI* (London, 1864), Vol. II, Pt. 2, p. 570.

[56] W. Forbes-Leith, *The Scots Men-at-Arms*, (Edinburgh, 1882), Vol. II, pp. 6–12.

[57] Milan, Bibl. Ambrosiana, MS. C 214 inf., f. 32r.

[58] R. Payne-Gallwey, *The Crossbow* (London, 1903), p. 132.

[59] See G. Giorgetti, *Le Armi Artiche* (Milan, 1964), p. 37.

[60] Soc. of Ant., London, Brander M.S. 129, f. 301.

[61] *Codex Atlanticus*, 56 R a.

[62] Brander MS. 129, f. 301.

[63] N. H. Nicolas (ed.), *The Privy Purse Expences of King Henry the Eighth* (London, 1827), p. 67.

[64] B. Grimschitz and B. Thomas, *A.E.I.O.V.*, *Ars Venandi in Austria* (Vienna, 1959), Pl. 4.

[65] J. Alm, 'Europeiska armborst', *Vaabenhistoriske Aarbøger*, Vol. Vb (1947), pp. 230–1.

[66] This translation is taken from Payne-Gallwey's *The Crossbow*, pp. 153–4.

[67] P. M. Feldhaus, 'Waffentechnisches aus der Nürnberger Löffelholz Handschrift von 1505', *Z.H.W.K.*, Vol. XV (1937), pp. 123–5.

[68] B. M., Arundel MS. 359, ff. 26v–29.

[69] Galerie Fischer, Luzern Sale, 26 June 1957, Lot 130.

[70] J. G. Mann, 'The Lost Armoury of the Gonzagas', *Roy. Arch. Journ.*, Vol. C (1945), p. 69, No. 177.

[71] R. Wegeli, *Inventar der Waffensammlung des Bernischen Historischen Museums in Bern* (Bern, 1948), Vol. IV, p. 27.

[72] See L. G. Boccia, *Nove Secoli di Armi da Caccia* (Florence, 1967), p. 65.

[73] *Let. Pap. Hen. VIII*, Vol. XXI, Pt. II, p. 403.

[74] *Ibid.*, Vol. XVIII, p. 101.

[75] V. Bathurst, *Bridleways through History* (London, 1948), p. 230.

[76] W. B. Rye, *England As Seen By Foreigners* (London, 1865), pp. 15–16.

[77] D. H. Wilson, *King James VI and I* (London, 1956), pp. 32, 179.

[78] W. Reid, 'A Royal Crossbow in the Scott Collection', *Scottish Art Review*, Vol. VII, No. 2 (1959), pp. 10–13, 29–30; *idem*, 'The Present of Spain', *Connoisseur* (August 1960), pp. 21–6.

[79] B.M., Add. MS. 34808, f. 44.

[80] *Cal. S.P. Dom., 1581–90*, p. 562.

[81] *Arte de Ballesteria y Monteria* (Madrid, 1644). Translation from Payne-Gallwey, *The Crossbow*, pp. 146–8.

[82] W. A. Baillie-Grohman, *Sport in Art* (London, 1919), p. 28.

[83] Soc. of Ant., London, Brander MS. 129, f. 256a.

[84] This is reproduced in Magné de Marolles, *La Chasse au fusil* (Paris, 1788), p. 37.

[85] *Vccelliera*, p. 66.

[86] Jagdsammlung de Westerweller, Galeries Fischer Sale, Luzern. May 1935, Lot 70.

[87] H. L. Blackmore, *Guns & Rifles of the World* (London, 1965), No. 766.

[88] Vol. III, p. 286.

[89] D. Higson, *The Bullet Crossbow* (Chorley, 1923).

[90] Vol. I, pp. 494–5.

[91] Sung Ying-Hsing (trans. E-Tu Zen Sun & Shiou-Chuan Sun), *T'ien-Kung K'ai-Wu* (Penn. State University, 1966), pp. 265–7.

[92] *Z.H.W.K.*, Vol. VII (1915–17), p. 156.

[93] E T. C. Werner, *Chinese Weapons* (Shanghai, 1932), p. 24.

[94] G. C. Stone, *Glossary of Arms and Armor* (Portland, 1934), pp. 211–12.

[95] J. Hornell, 'South Indian Blow-guns, Boomerangs, and Crossbows', *Journ. Roy. Anthr. Inst.*, Vol. LIV (1924), pp. 341–5.

[96] H. Balfour, 'The Origin of West African Crossbows', *Journ. Afr. Soc.*, Vol. VIII (1909), pp. 337–56.

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[1] H. L. Blackmore, *Guns and Rifles of the World* (London, 1965), pp. 4–6.

[2] W. A. Baillie-Grohman, *Sport in Art* (London, 1919), pp. 60–3.

[3] Austrian National Library, Vienna. Cod. Vind. 7962.

[4] Vienna. Cod. Vind. 10824.

[5] N. H. Nicolas (ed.), *The Privy Purse Expences of King Henry the Eighth* (London, 1827), pp. 104, 194.

[6] H. L. Blackmore, *Royal Sporting Guns at Windsor* (London, 1968), p. 1.

[7] H. A. Dillon, 'Arms and Armour at Westminster, the Tower and Greenwich, 1547', *Archaeologia*, Vol. LI (1888), pp. 219–80.

[8] Two of these survive in the Tower of London Armouries (XII–1 and 2).

[9] Baillie-Grohman, *Sport in Art*, p. 96.

[10] F. H. Cripps-Day, 'An Inventory of the Armour of Charles V', *Fragmenta Armamentaria*, Vol. II (1951), Pt. 5, pp. 60–1, 72–5.

[11] An extremely rare book, cited by bibliographers. I have not been able to trace a copy.

[12] 'Household Accounts of the Lestrangs', *Archaeologia*, Vol. XXV (1834), p. 120.

[13] *Let. Pap. Hen. VIII*, Vol. XIV, Pt. 2, p. 156.

[14] *Caccia della Campagna di Roma* (Rome, 1548).

[15] John Gage, *The History and Antiquities of Hengrave* (London, 1822), p. 138.

[16] P.R.O., S.P. 12/15, No. 36.

[17] *Cal. Pat. Rolls, Eliz. I*, Vol. IV, No. 109.

[18] R. H. Hobart Cust, *The Life of Benvenuto Cellini* (London, 1927), p. 94.

[19] See the illustration from Vita Bonfadini's *La Caccia dell' Arcabugio* (Venice, 1691), reproduced in R. Held's *The Age of Firearms* (New York, 1957), p. 67.

[20] *Archaeologia*, Vol. LI (1888), pp. 263, 271.

[21] *Proc. Hug. Soc.*, Vol. XX, No. 6 (1958–64), p. 678.

[22] H. L. Blackmore, *Guns and Rifles of the World* (London, 1965), Nos. 81–133.

[23] The word is derived from the Dutch or Flemish *snaphaan* (i.e. snapping hen). By a process of association it meant an armed robber. Thus in 1544 the King's messengers in the Low Countries asked for guards for their protection as the roads were said to be 'dangerous of snaphances' (*Let. Pap. Hen. VIII*, Vol. XIX, Pt. 1, p. 359).

[24] The word, which appears to have come into use late in the nineteenth century, is derived from the Spanish *miquelete*, the term applied to Catalonian mountain irregulars who presumably carried guns with these locks.

[25] See J. Guiffrey, *Inventaire général du mobilier de la couronne sous Louis XIV* (Paris, 1886), Vol. II.

[26] G. E. Löhneyss, *Della Cavallerie* (Remlingen, 1624), p. 288.

[27] Some copies of the 1609 edition do not include this print.

[28] John Josselyn, *An Account of two Voyages to New-England* (London, 1674), p. 95.

[29] The engraving of 'Stalking' was executed by Arthur Soly in 1683.

[30] *The Gentlemans Recreation* (London, 1686), pp. 124–5.

[31] N. M. Penzer, *Sir John Chardin's Travels in Persia*, (London, 1927), p. 182.

[32] *Gentlemans Recreation*, p. 134.

[33] *Ibid.*, p. 138.

[34] P. E. P. Deraniyagala, 'Sinhala Weapons and Armor', *Journ. Ceylon Branch Roy. Asia Soc.*, Vol. XXXV (1942), No. 95, Pt. 3, pp. 127–31.

[35] S. G. Pereta (trans.), *The Temporal and Spiritual Conquest of Ceylon* (Colombo, 1930), Vol. 1, p. 99.

[36] Trans. E-tu Zen Sun and Shiou-Chuan Sun, Penn. State University Press, 1966, pp. 272–6.

[37] Blackmore, *Guns and Rifles of the World*, Chap. 6 and Nos. 349–428.

[38] See D. R. Baxter, *Superimposed Load Firearms, 1360–1860* (Hong Kong, 1966); Blackmore, Nos. 511–46.

[39] H. L. Blackmore, *Royal Sporting Guns at Windsor* (London, 1968), Nos. 413, 430.

[40] See *Guns and Rifles of the World* Nos. 560–91 for revolvers, Nos. 641–88 for magazine guns.

[41] *Ibid.*, Nos. 491–5.

[42] *Archaeologia*, Vol. LI (1888), p. 273.

[43] *Catalogue des Armes de la Collection Spitzer*, 10–14 June 1895, No. 340, p. 69.

[44] E. D. Cuming (ed.), *Squire Osbaldeston: His Autobiography* (London, 1926), p. 184.

[45] *The Shooting Directory* (London, 1804), p. 191.

[46] *Ibid.*, p. 149.

[47] J. Muir, *John Anderson* (Glasgow, 1950) pp. 49–52.

[48] Schwerdt, III, Pl. 199. R. Held, *The Age of Firearms* (New York, 1957), p. 159.

[49] *The Sporting Magazine*, Vol. L (1817), pp. 46–7. In Lisle Street, London lived both gunmakers and some of the most notorious whores in town.

[50] See H. L. Blackmore, *Firearms* (London, 1964), pp. 82–3.

[51] E. Parker (ed.), *Colonel Hawker's Shooting Diaries* (London, 1931), p. 99.

[52] *The Shooting Directory* (London, 1804), p. 197.

[53] *The Gun and its Development* (London, 1910), p. 386.

[54] *The Shooting Directory*, p. 399.

[55] Daniel, *Rural Sports*, Vol. III, p. 88.

[56] D. Chandler, *The Campaigns of Napoleon* (London, 1967), pp. 593–4.

[57] See M. Bottet, *La Manufacture d'armes de Versailles An II–1818, Boutet Directeur Artiste*, (Paris, 1903).

[58] See S. V. Grancsay, *Master French Gunsmiths' Designs* (New York, 1970), Pls. 107–18. Torsten Lenk in *The Flintlock* (London, 1960), Pl. 131 (3 and 4) illustrates similar designs signed by Lucas.

[59] R. Payne-Gallwey (ed.), *The Diary of Colonel Peter Hawker* (London, 1893), Vol. II, p. 130.

[60] *Diary* (Parker edition), p. 133.

[61] G. Peel (ed.), *The Private Letters of Sir Robert Peel* (London, 1920), pp. 59–60.

[62] E. D. Cuming (ed.), *Squire Osbaldeston: His Autobiography* (London, 1926), p. 182.

[63] *Ibid.*, pp. 183–4.

[64] 'Thormanby', *Kings of the Rod, Rifle and Gun* (London, 1901), Vol. I, p. 125.

[65] *The Field*, 30 March 1889, p. 428.

[66] H. L. Blackmore, *British Military Firearms* (London, 1961), Chap. 8: W. Keith Neal and D. H. L. Back, *Forsyth & Co.: Patent Gunmakers* (London, 1969).

[67] Blackmore, *Guns and Rifles of the World*, pp. 45–57.

[68] A double-barrelled cannon with the same kind of breech made for the King of Siam is now in a private collection.

[69] *Experts on Guns and Shooting* (London, 1900), p. 10.

[70] 'The Old Shekarry', H.A.L., *The Hunting Grounds of the Old World* (London, 1860), pp. 495, 498.

[71] D. Higson, *The Bullet Crossbow* (Chorley, 1923), pp. 38–9.

[72] Blackmore, *Guns and Rifles of the the World*, Nos. 280–4.

[73] D. R. Baxter, *Superimposed Load Firearms, 1360–1860*, (Hong Kong, 1966), Pl. 1.

[74] H. L. Blackmore, *Royal Sporting Guns at Windsor* (London, 1968), No. L.347.

[75] W. W. Greener, *The Gun* (London, 1910), p. 493.

[76] *Ibid.*, p. 504.

[77] See W. Keith Neal, *Spanish Guns and Pistols* (London, 1955), pp. 50–1.

[78] A. Angelucci, *Catalogo della Ameria Reale* (Turin, 1890), p. 409.

[79] R. Held, *The Age of Firearms* (New York, 1957), p. 36.

[80] M. Thierbach, *Die geschichtliche Entwickelung der Handfeuerwaffen* (Dresden, 1887), p. 169. The original records have disappeared.

[81] W. G. Renwick, 'The Earliest Known Rifle', *The American Rifleman*, March 1953, pp. 15–18, 75.

[82] J. Lugs, *A History of Shooting* (London, 1968), p. 21.

[83] W. A. Baillie-Grohman, *Sport in Art* (London, 1919), p. 98.

[84] *Katalogue ausgewählter Waffen . . . aus dem vormaligen besitze des Herrn Grafen L.Th. . . . auf Schloss Benatek in Böhmen*, Köln, 1893, No. 1.

[85] Lugs, *History of Shooting*, pp. 30–4.

[86] W. A. Baillie-Grohman, *Sport in the Alps* (London, 1896), p. 170.

[87] See August Flecken *Historische und Physicalische Nachricht von dem Königl. Pohln und Churfürst. Sachsischen Jagt-Palais Hubertsburg*, Leipzig, 1740 and *Hubertsburg bei Wermsdorff*, 1727.

[88] L. Lloyd, *Field Sports of the North of Europe* (London, 1830), Vol. I, pp. 158–61.

[89] A pound of lead would produce 48 bullets of ·45 in. calibre compared with only 16 bullets of ·70 in. calibre.

[90] *The Kentucky Rifle* (New York, 1946), pp. 67–8, 71.

[91] *Ibid*, pp. 8–9.

[92] See H. L. Blackmore, *British Military Firearms* (London, 1961), pp. 91–3.

[93] See H. L. Blackmore, 'The Seven-barrel guns', *Journ. Arms & Armour Soc.*, Vol. I (1953–5), pp. 177–8.

[94] From *New Principles of Gunnery* (London, 1742), quoted by Baker in his *Remarks on Rifle Guns* (London, 1835), p. 87.

[95] *Handbook for Hythe* (London, 1860), pp. 122–3.

[96] *Nachricht von gezogenen Büchsen* (Nürnberg, 1735).

[97] An analysis of the guns used by Baker, compiled from his various writings, was published by E. N. Barclay in *Big Game Shooting Records* (London, 1932), p. 60. See also S. W. Baker, *Wild Beasts and their Ways* (London, 1890), pp. 2–3.

[98] British Museum. Arundel MS. 263, f. 54. See R. Calder, *Leonardo & the Age of the Eye* (London, 1970), p. 77.

[99] Wheel-lock guns by Andreas Neidhart of Elsinore with trefoil section and cinquefoil section are in the Tøjhusmuseet, Copenhagen (Nos. B. 162–3); flint-lock guns with heart-shaped sections by Jacob Walster, *c.* 1760, are in the Royal Collection, Windsor (No. L. 401) and by Philip Hess, *c.* 1770, in the Bayerisches Nationalmuseum, Munich (No. 13/867).

[100] Hans Busk, *Hand Book for Hythe* (London, 1860), p. 131.

[101] Samuel Baker writing to *The Field*, on 23 March 1861 confirmed this figure.

[102] *The Sporting Rifle and its Projectiles* (London, 1863), p. 72.

[103] *Journal of Rudolf Friederich Kurz During the Years 1846 to 1852*, pp. 194–5.

[104] See C. E. Hanson Jr., *The Plains Rifle* (New York, 1960).

[105] A. Hatch, *Remington Arms* (New York, 1956), p. 154.

[106] R. I. Dodge, *The Hunting Grounds of the Great West* (London, 1877), pp. 140–3.

[107] R. Fulford, *The Prince Consort* (London, 1949), pp. 91–2.

[108] W. A. Baillie-Grohman, *Sport in the Alps* (London, 1896), p. 21.

[109] W. A. Baillie-Grohman, *Sport in Art* (London, 1919), p. 96.

[110] Several 'birdinge peeces' were included in the stores of the Royalist Army at Oxford in 1643 (I. Roy, 'The Royalist Ordnance Papers, 1642–1646', *Trans. Oxford Record Soc.*, Vol. XLIII (1964), pp. 89–91).

[111] H. L. Peterson, *Arms and Armor in Colonial America* (Harrisburg, 1956), pp. 42–3.

[112] Vol. II published by Roxburghe Club (1905), p. 134.

[113] See H. L. Blackmore, *British Military Firearms* (London, 1961), p. 82.

[114] Peterson, *op. cit.*, p. 208.

[115] H. L. Blackmore, *Royal Sporting Guns at Windsor* (London, 1968), p. 11.

[116] E. Parker, *Colonel Hawker's Shooting Diaries* (London, 1931), pp. 37, 75–6.

[117] Henry Alken did an aquatint of an amusing scene showing a sportsman wearing these pattens caught by the rising tide. See *A Cockney's Shooting Season in Suffolk* (London, 1822).

[118] 'Extracts from the Game Books and Diaries of Sir Ralph Payne-Gallwey', *Shooting Times*, 25 October 1969.

[119] *The Wild Fowler* (London, 1897), p. 178.

[120] W. W. Greener, *The Gun and its Development* (London, 1910), p. 513.

[121] R. Corneli, *Die Jagd und ihre Wandlungen in Wort und Bild* (Amsterdam and Leipzig, 1884).

[122] G. W. Manby, *Journal of a Voyage to Greenland in the Year 1821* (London, 1822), p. 16.

[123] W. Scoresby, *An Account of the Arctic Regions with a History and Description of the Northern Whale-Fishery* (Edinburgh, 1820), pp. 70–1.

[124] *Trans. Soc. Arts*, Vol. II (1784), p. 191.

[125] *Annual Register* (1772), Chronicle 11 March, p. 83.

[126] *Trans. Soc. Arts*, Vol. VII (1789), pp. 181–7.

[127] *Trans.*, Vol. XI (1793), pp. 185–92.

[128] Scoresby, *Account*, pp. 227–8.

[129] 9th Edit. (1910), pp. 515–16. The description differs little from that given by W. Greener in *Gunnery in 1858*, pp. 433–4.

[130] G. W. Manby, *Journal*, p. 16.

[131] See L. Harrison Matthews (ed.), *The Whale* (London, 1968), pp. 188–92.

[132] C. Blair, *Pistols of the World* (London, 1968), pp. 1–4.

[133] Lady Newton, *The House of Lyme* (London, 1917), p. 283.

[134] Blair, *Pistols*, No. 99.

[135] W. Blane, *Cynegetica* (London, 1788), p. 187.

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[137] *Ibid.* Vol. II, pp. 219–20.

[138] James A. Hadley, 'A Royal Buffalo Hunt', *Kansas State Hist. Soc. Trans.*, Vol. X (1908), pp. 564–74.

[139] J. E. Parsons, *Smith & Wesson Revolvers* (New York, 1957), p. 190.

[140] *Life Amongst the Indians* (London, 1861), p. 228; *Last Rambles Amongst the Indians*, etc. (London, 1868), p. 272. See also G. Norman-Wilcox, 'The Almanac: Catlin's Lithographs Showing Colt Firearms', *Antiques*, Vol. XXVII (1940), p. 35.

[141] W. Winans, *The Art of Revolver Shooting* (London, 1911), pp. 273–89.

[142] E. W. Marsden, *Greek and Roman Artillery* (Oxford, 1969), p. 41.

[143] E. MacCurdy, *The Notebooks of Leonardo da Vinci* (London, 1938), Vol. II, p. 188.

[144] F. M. Feldhaus, 'Zur Geschichte der Windbüchse', *Z.H.W.K.*, Vol. III (1905), p. 271.

[145] H. L. Blackmore, *Guns and Rifles of the World* (London, 1965), p. 91.

[146] At a later date was invented the real spring gun in which the movement of the spring alone ejects the bullet.

[147] P.R.O., London, S.P. 14/185. An all-brass airgun is in the Pitt Rivers Museum, Oxford (No. PR. 74). See Blackmore, *Guns and Rifles*, No. 731.

[148] L. de Gaya, *Traité des Armes, des Machines de Guerre* (Paris, 1678), p. 30.

[149] *Hydraulica Pneumatica* (Paris, 1644), p. 154.

[150] *Mathematical Magick* (London, 1648), p. 153.

[151] Tøjhusmuseet, Copenhagen, Nos. B 526–9; Livrustkammaren, Stockholm No. 3856.

[152] Thurloe's *State Papers* (London, 1742), 12 November 1655.

[153] P.R.O., W.O. 51/50 and 51/64.

[154] Blackmore, *Guns and Rifles*, Coloured Cover and Nos. 733–6.

[155] J. T. Desaguliers, *A Course of Experimental Philosophy* (London, 1744), Vol. II, pp. 398–402.

[156] The name is also spelt Girandoni, Gilardoní. See W. Hummelberger and L. Scharer, 'Die österreichische Militär-Repetierwindbüchse und ihr Erfinder Bartholomäus Girandoni', *Waffen- und Köstumkunde*, Vol. VI (1964), Vol. VII (1965); and Mario Morin, 'Schioppi a vento a Cortina', *Diana Armi*, Vol. III (1969), No. 3, pp. 82–7.

[157] It is referred to in 1767 as the invention of Dr. Thomas Ellis of Dublin (see Blair, *Pistols of the World*, p. 153), but earlier examples are to be found (see *Schloss Ettersburg Sale Catalogue*, 1927, Lot No. 3). Also Desaguliers describes one in his *Course of Experimental Philosophy*, 1744.

[158] E. H. K. Maleyka, *Windbüchsen des 17 und 18 Jahrhunderts als Jagt- und Kriegswaffen, Blasrohre* (Berlin, 1937), p. 3.

[159] Because of its silent operation European authorities were always fearful that the airgun might be used for some subversive purpose and, from time to time, it was banned or its sale restricted to certain classes of the population.

[160] E. Major, 'Ein Luftgewehr des Basler Erfindes Johann Georg Guntner (1646–1726), *Hist. Mus. Basel J. & R.*, 1933, pp. 43–7.

[161] Maleyka, *op. cit.* See also Kummer and Himmelsbach, 'Die Windbüchsen des Landgraf Ludwig VIII in Kranichstein', *Der Deutsche Jager*, 1936.

[162] *A Sporting Tour Through Various Parts of France in the Year 1802* (London, 1806), Vol. I, pp. 37, 70, 160.

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[164] E. M. Reilly Junr., *A Treatise on Airguns* (London, n.d. [1850?]).

[165] E. Malatesta, *Armi ed Armaioli d'Italia* (Rome, 1946), p. 233.

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[2] G. Dennis, *The Cities and Cemeteries of Etruria* (London, 1878), Vol. I, pp. 249–54.

[3] M. I. Artamonov, *Treasures from Scythian Tombs* (London, 1969), Pls. 166, 170, 174.

[4] H. Cary (trans.), *Herodotus* (London, 1891), p. 438 (VII, 85).

[5] J. E. Tennent, *Ceylon* (London, 1859), Vol. I, p. 499.

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[7] There is some evidence to suggest that it was known to the Ancient Egyptians and the Assyrians.

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[9] *Life Amongst the Indians* (London, 1861), pp. 225–6; *Last Rambles Amongst the Indians of the Rocky Mountains and the Andes* (London, 1868), p. 265. His paintings are described in *Catalogue, Description and Instructions, Catlin's Indian Cartoons*, etc. (New York, 1871), Nos. 537, 485.

[10] H. S. Cowper, *The Art of Attack* (Ulverston, 1906), p. 202.

[11] Stone, *Glossary*, pp. 124–5.

[12] Virgil, *Georgica*, I, v. 308–9.

[13] For details of the classic sling and bullets, see W. Hawkins, 'Observations on the use of the sling', *Archaeologia*, Vol. XXXII (1847), pp. 96–107.

[14] E. M. Burgess, 'An Ancient Egyptian Sling Reconstructed', *Journal Arms & Armour Soc.*, Vol. II (1956–8), pp. 226–30.

[15] See A. Berger, *Die Jagd aller Völker* (Berlin, 1928), p. 47, and K. G. Lindblom, *The Sling, especially in Africa* (Stockholm, 1940), p. 9.

[16] F. Stenton (ed.), *The Bayeux Tapestry* (London, 1957), Pl. 12.

[17] B.M., Add. MS. 42130, f. 171.

[18] *Epitoma Institutionum Militaris* (Leipzig, 1869), Vol. III, p. 14.

[19] H. Mahr, 'Die Steinschleuder, eine der ältesten Waffen der Menscheit', *Waffen- und Kostümkunde*, 1964 (2), p. 123. See also A. Demmin, *Arms and Armour* (London, 1894), p. 467.

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[23] K. G. Lindblom, *The Sling, especially in Africa* (Stockholm, 1940), pp. 11, 35.

[24] P. E. P. Deraniyagala, 'Sinhala Weapons and Armor', *Journ. Roy. Asia Soc.* (Ceylon), Vol. XXXV (December 1942), p. 122.

[25] Lindblom, *The Sling*, p. 34.

[26] British Museum Nos. 62080, 59703. See also Lt. Gen. Pitt Rivers, 'On the Egyptian Boomerang and its Affinities', *Journ. Anthr. Inst.*, Vol. XII (1883), pp. 454–63.

[27] G. Oppert, *On the Weapons, Army, Organisation, etc. of the Ancient Hindus* (Madras, 1880), pp. 18–19.

[28] R. H. H. Cust, *The Life of Benvenuto Cellini* (London, 1927), Vol. II, p. 237. In some translations the Italian word for a blowpipe, *cerbottana*, is wrongly translated as an airgun or a pop-gun.

[29] One of these blow pipes is in the Tower of London Armouries (No. XII–1796).

[30] E. G. Wolff, *Air Guns* (Milwaukee, 1958), pp. 45–6.

[31] Lord Stanley of Alderley, *The First Voyage Round the World by Magellan* (London, 1874), p. 109.

[32] 'Historical and Ethnographical Materials on the Jivaro Indians', *Bulletin Bureau American Ethnology*, Vol. 117 (1938), pp. 80–5.

[33] C. Hose and W. McDougall, *The Pagan Tribes of Borneo* (London, 1912), Vol. I, pp. 216–17. This operation is illustrated in J. A. Hammerton, *Peoples of All Nations* (London, n.d. [*c.* 1925]), Vol. II, pp. 826–32.

[34] W. H. Furness, *The Home-Life of the Borneo Head-Hunters*, etc. (Philadelphia, 1902), p. 177.

[35] Cowper, *The Art of Attack*, p. 243. J. G. Wood, *Man and his Handiwork* (London, 1886), p. 286.

[36] J. Hornell, 'South Indian Blow-guns, Boomerangs and Crossbows', *Journ. Roy. Anthr. Inst.*, Vol. LIV (1924), pp. 316–35.

[37] Wood, *Man and his Handiwork*, pp. 161–2.

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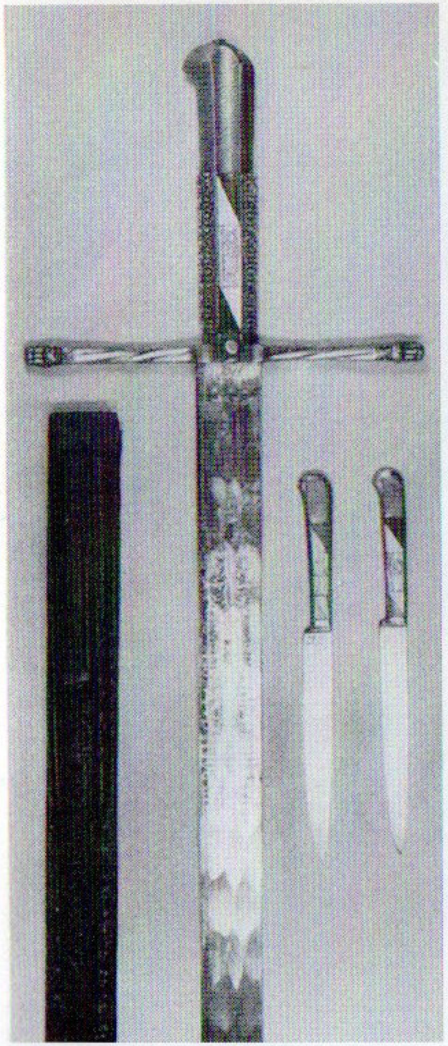
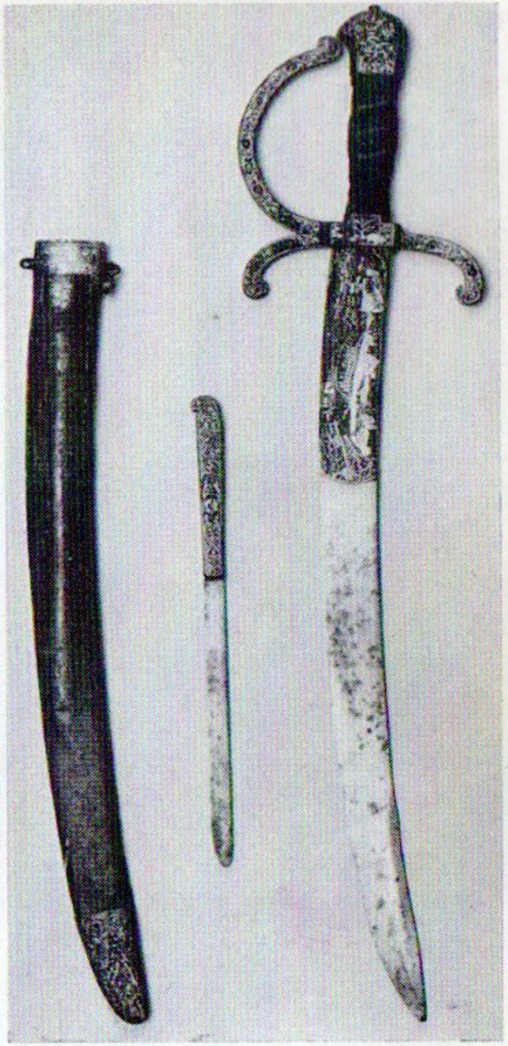
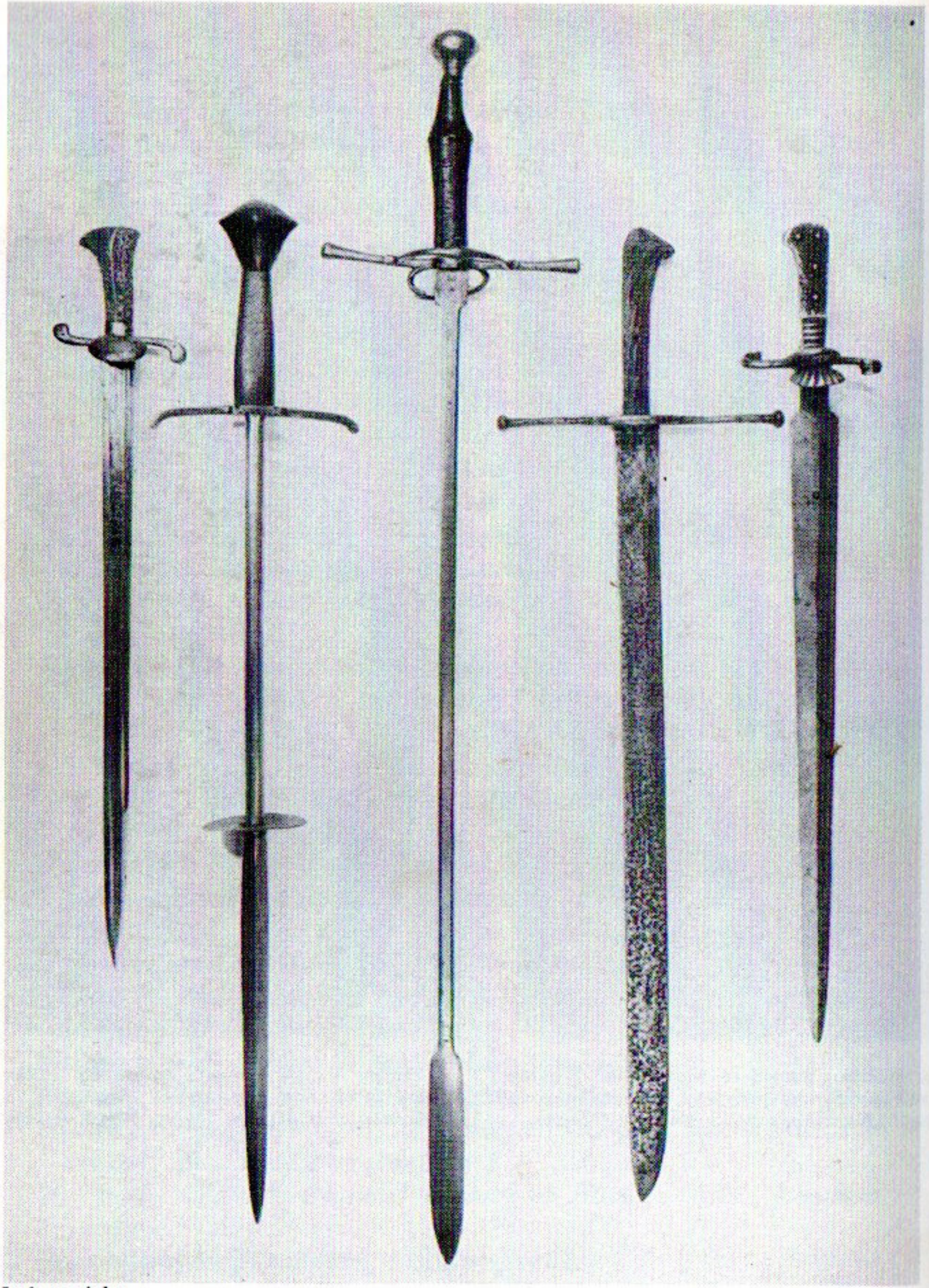


1. Hunting sword of Maximilian I made by Hans Sumersperger of Hall in Tyrol in 1496. *Kunsthistorisches Museum, Vienna.*

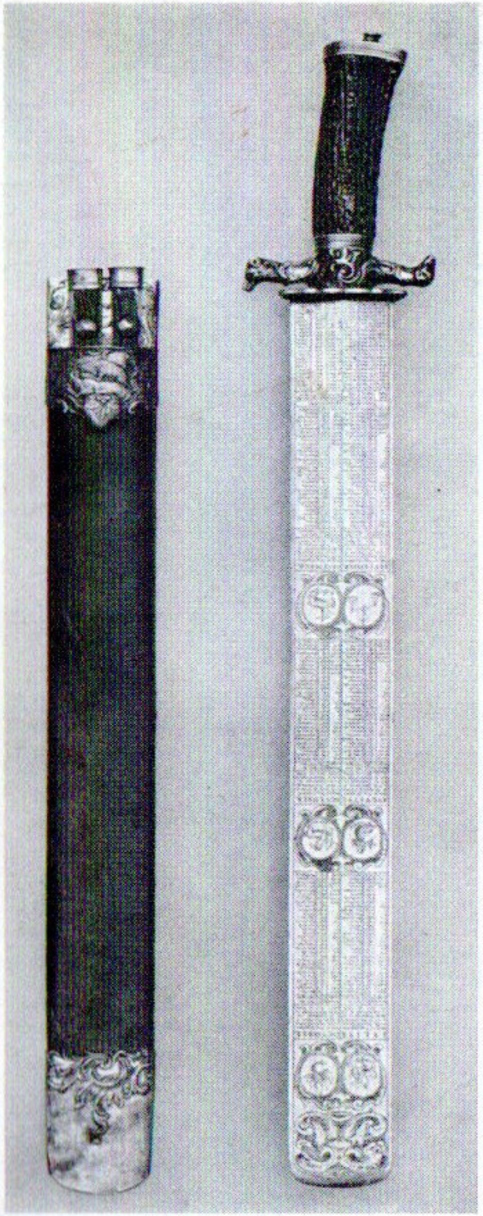


2. Henry VIII's hanger. Made by Diego de Çaias after the capture of Boulogne, 1544. *Collection of H.M. The Queen, Windsor Castle.*

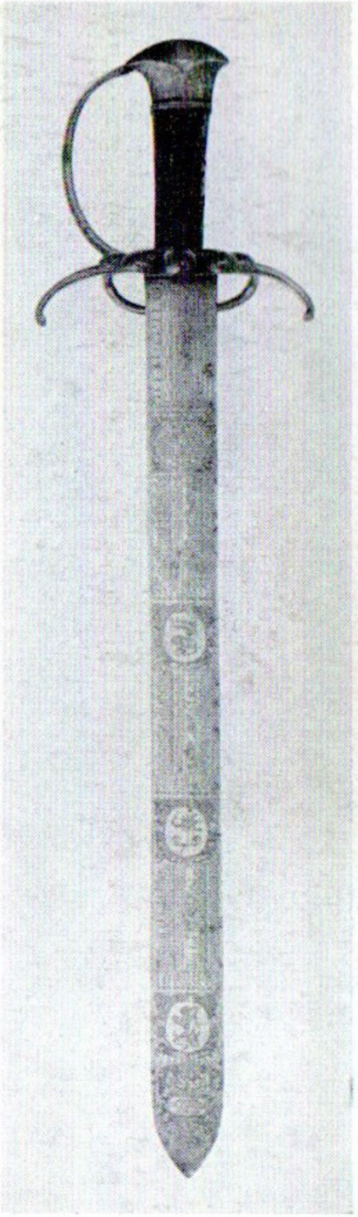


Left to right

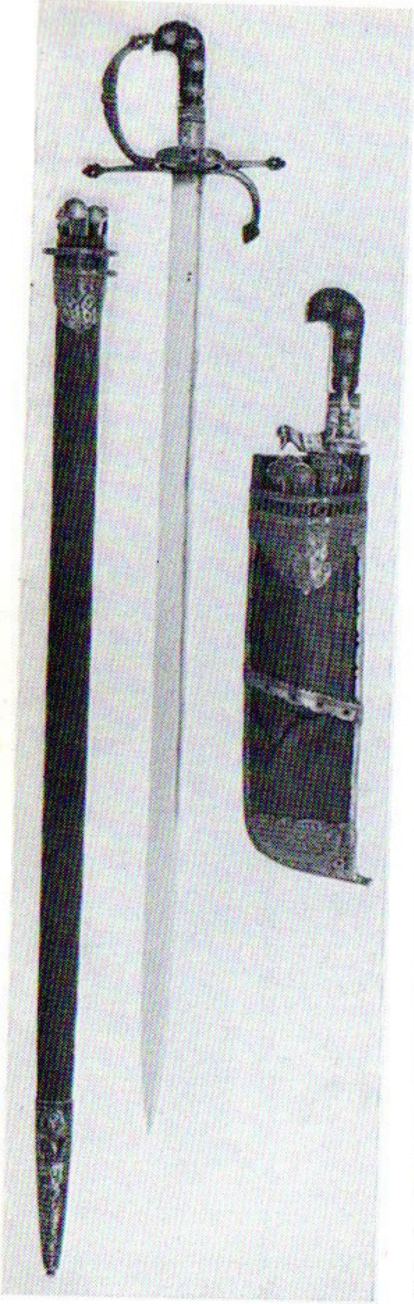
3. Hunting hanger with engraved blade. *German, c.* 1650.
4. Boar tuck with disc stop. *German, c.* 1600.
5. Boar spear sword, bears mark of Wolfgang Stantler. *German, c.* 1550.
6. Great hunting sword with staghorn handle. *German, c.* 1520.
7. Thrusting sword with shell guard. *German, c.* 1620. *Deutsches Jagdmuseum, Munich.*

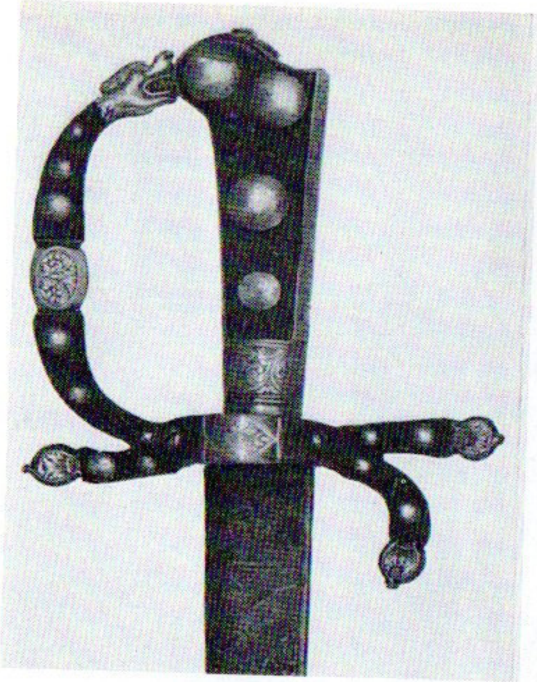


8. Silver-mounted hunting trousse, the chopper blade engraved with the calendar for 1678. *German. Metropolitan Museum, New York.*

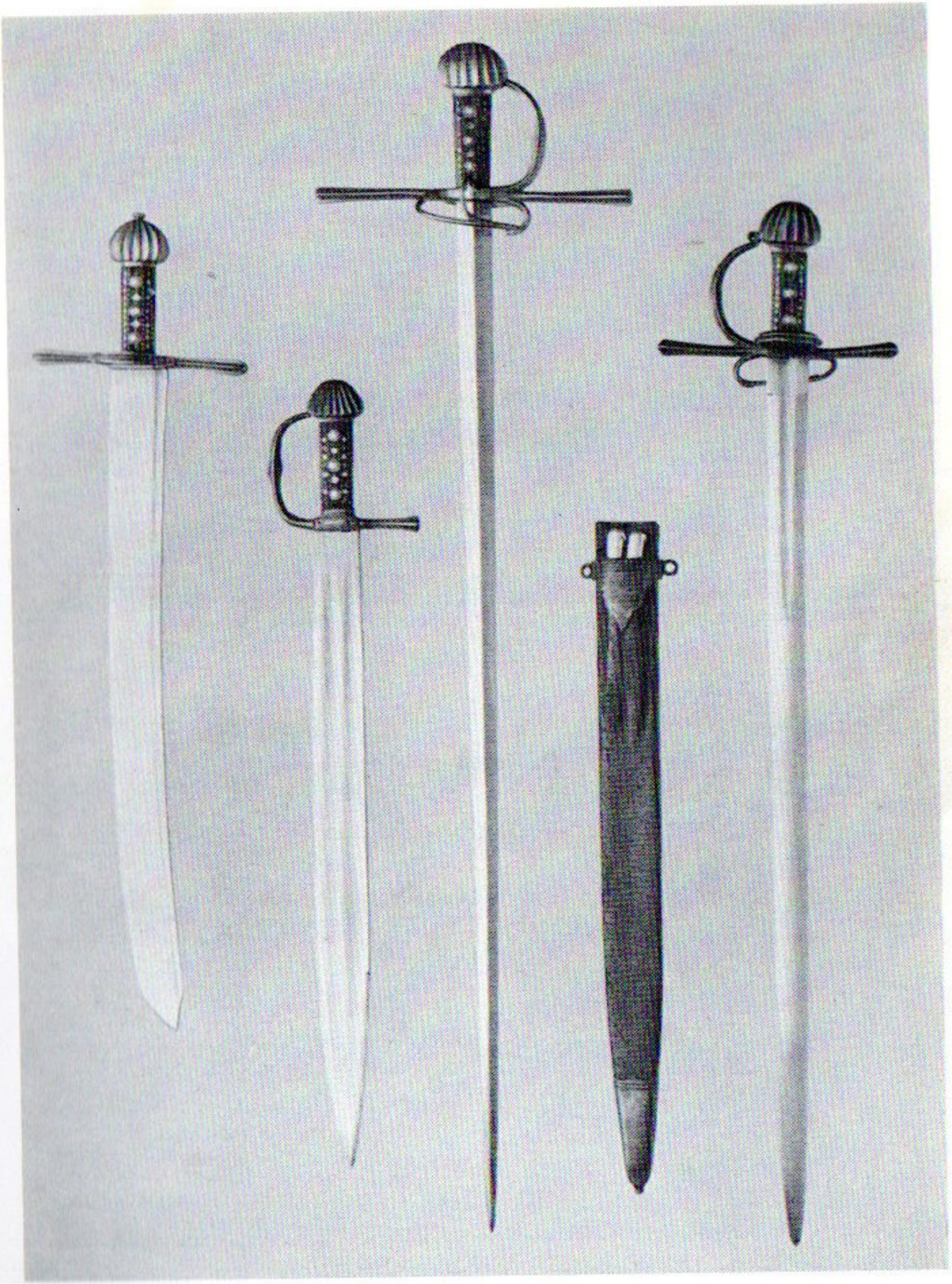


9. Hunting sword. Damascened steel hilt, *c.* 1550. Calendar blade *c.* 1686, bearing name of Adam Ehinger, Landleutenant of Stadtamhof, near Regensburg. *Tower of London.*



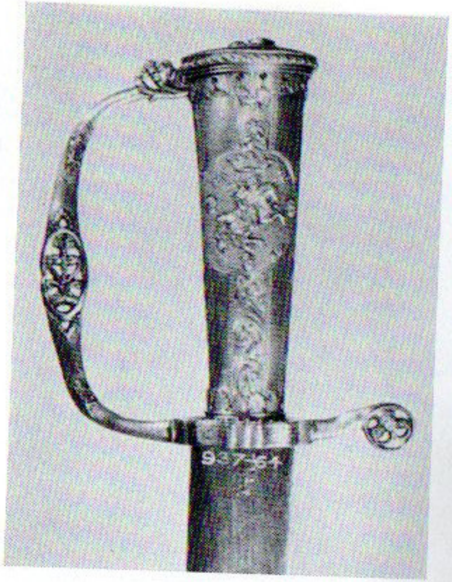


10. (*left*) Hunting garniture of sword and trousse. *Saxon*, dated 1662. *Tower of London.*
11. (*top right*) Hunting sword. Brass hilt with facings of staghorn and silver. *Italian*, *c.* 1660. *Metropolitan Museum, New York.*
12. (*bottom right*) Hunting sword. Iron hilt with silver decoration. *German*, dated 1654. *Victoria & Albert Museum, London.*



13. Rapiers and hangers with bright steel hilts from a hunting garniture of Frederick II of Denmark. *Danish*, dated 1584–6. *Tøjhusmuseet, Copenhagen.*

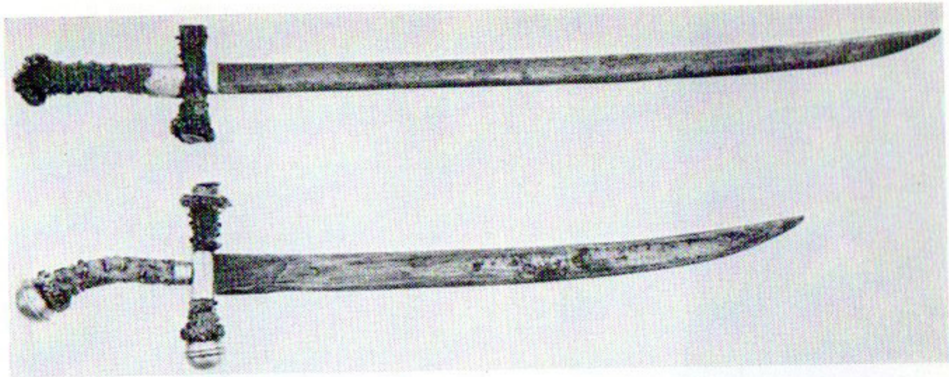
14. Hanger hilt of russet iron encrusted with silver. *English, c.* 1650. *Tower of London.*



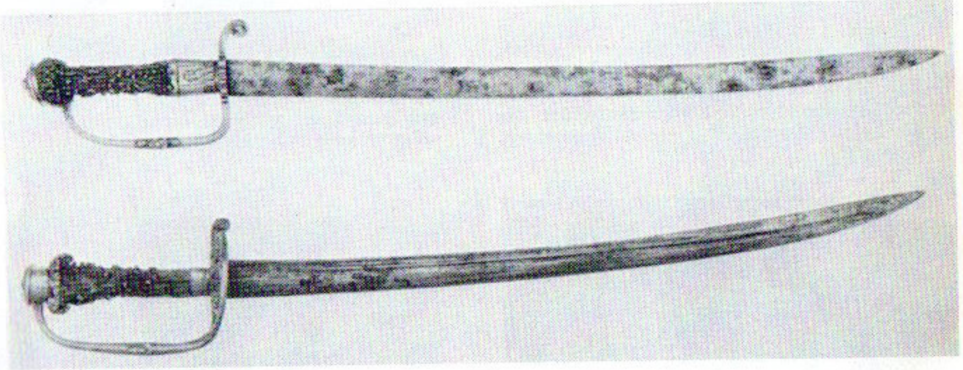
15. Silver hanger hilt. *English, c.* 1680. *Victoria & Albert Museum.*

16. Shakudo hanger hilt. *Japanese, c.* 1700. *Victoria & Albert Museum.*

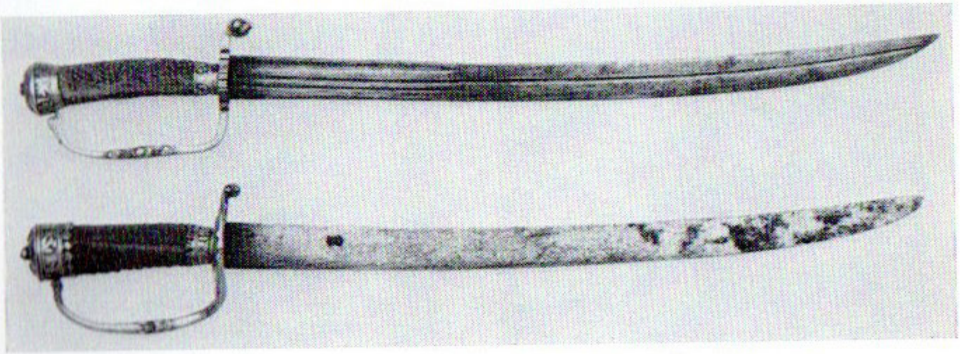
17. Cast brass hilt, gilt relief on blue enamel ground. *English, c.* 1680. *Tower of London.*



18. Hanger with buckhorn hilt (silver caps missing). *English, c.* 1700. *G. Mungeam Collection.*
19. Hanger with silver-mounted buckhorn hilt. *English, c.* 1700. *Brecon Cathedral.*



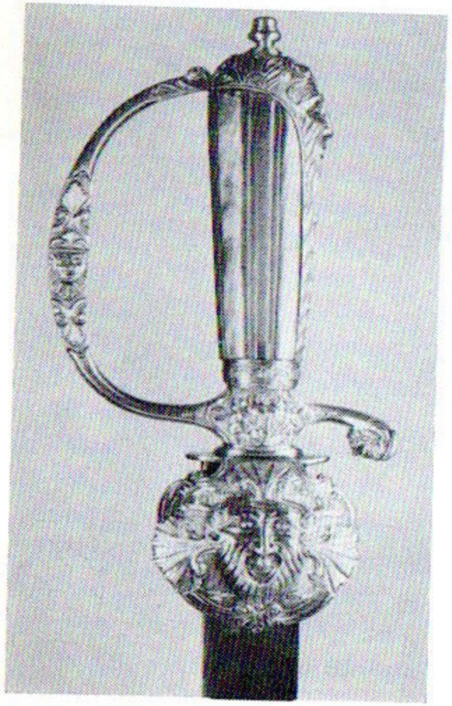
20. Hanger with silver-mounted buckhorn hilt. *English, c.* 1690.
21. Hanger with brass-mounted buckhorn hilt. *English, c.* 1700. *Author's Collection.*



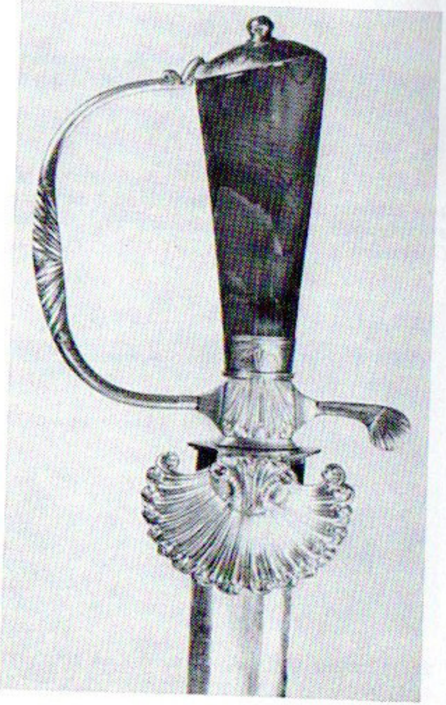
22. Hanger with silver-mounted staghorn hilt (mark IH in a heart). *English, c.* 1700.
23. Hanger with brass mounts. Blade with London Cutlers' Company mark. *English, c.* 1690. *Author's Collection.*

24. Rhinoceros horn hilt of hanger made for Christian V of Denmark before his accession. *Dutch* (?), *c.* 1650. *Rosenborg, Copenhagen.*

25. Hanger hilt with agate grip. Silver-gilt guard set with garnets. *German, c.* 1675. *Rosenborg, Copenhagen.*



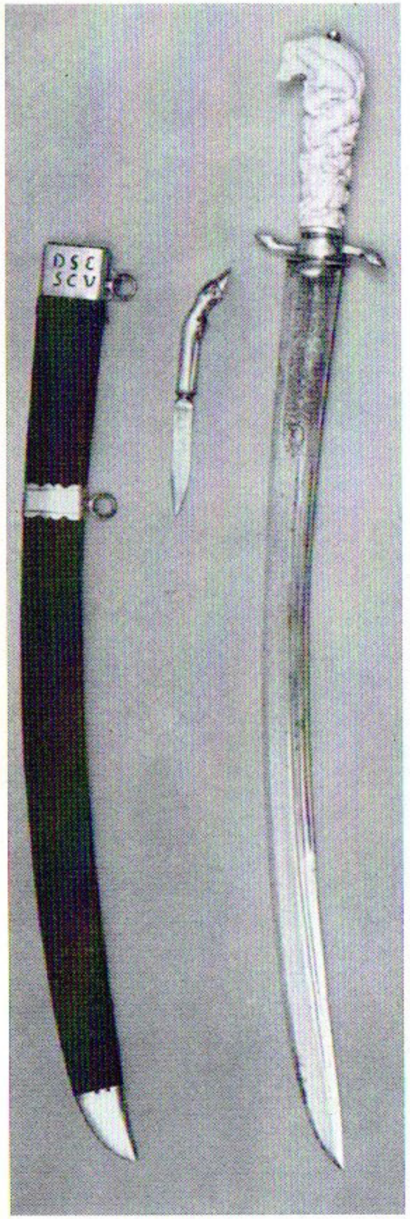
26. Hanger hilt. Horn grip, silver mounts. *English*, hallmarked 1724–5. *Victoria & Albert Museum.*



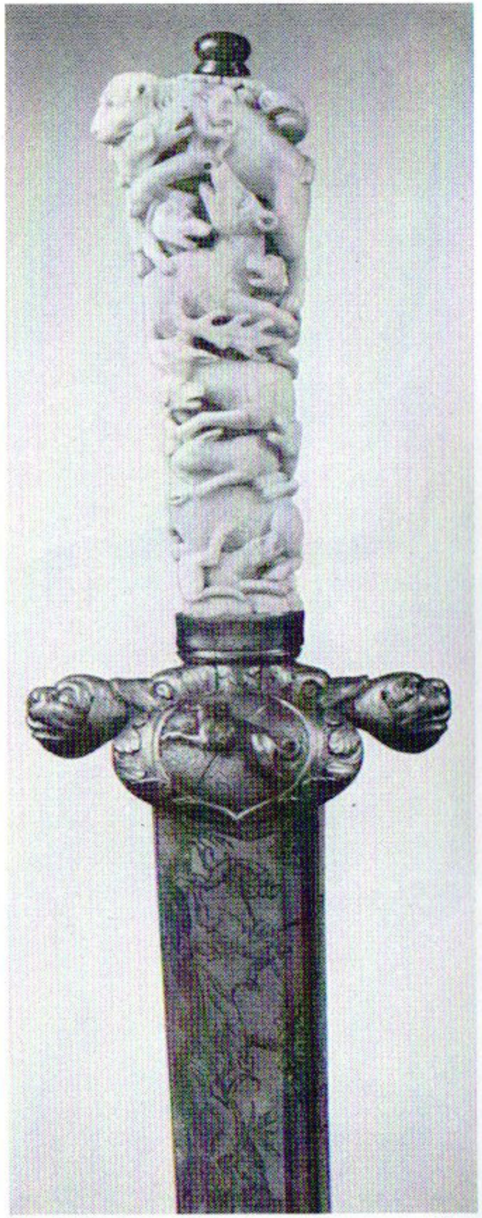
27. Hanger hilt. Agate grip, silver mounts. *English*, hallmarked 1739–40. *Victoria & Albert Museum.*

28. Hanger with tortoiseshell grip inlaid with gold. Brass-gilt mounts. *S. German, c.* 1730. *Kunsthistorisches Museum, Vienna.*

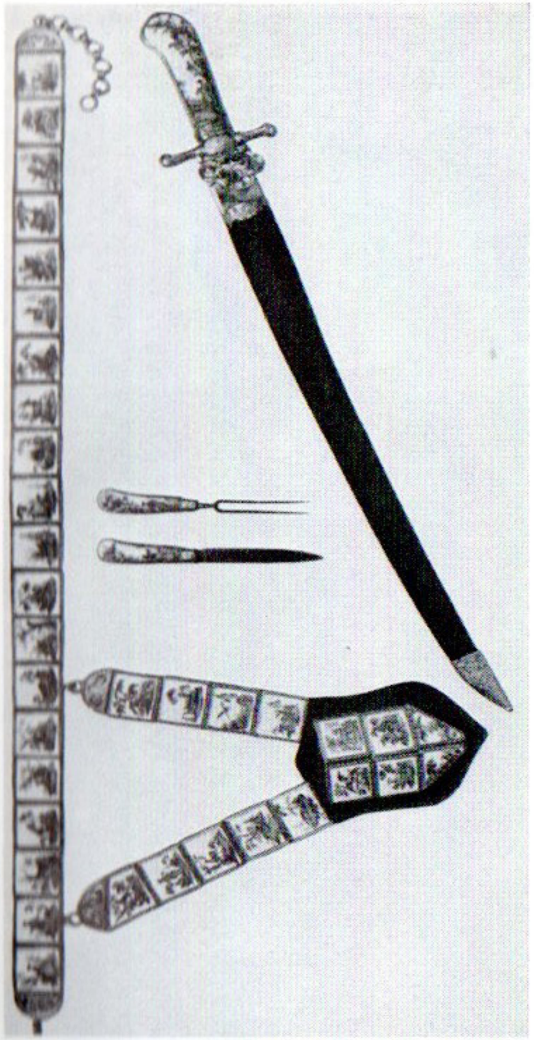
29. Hanger with tortoiseshell grip inlaid with silver. Silver hilts and mounts. *German, c.* 1750. *Metropolitan Museum, New York.*



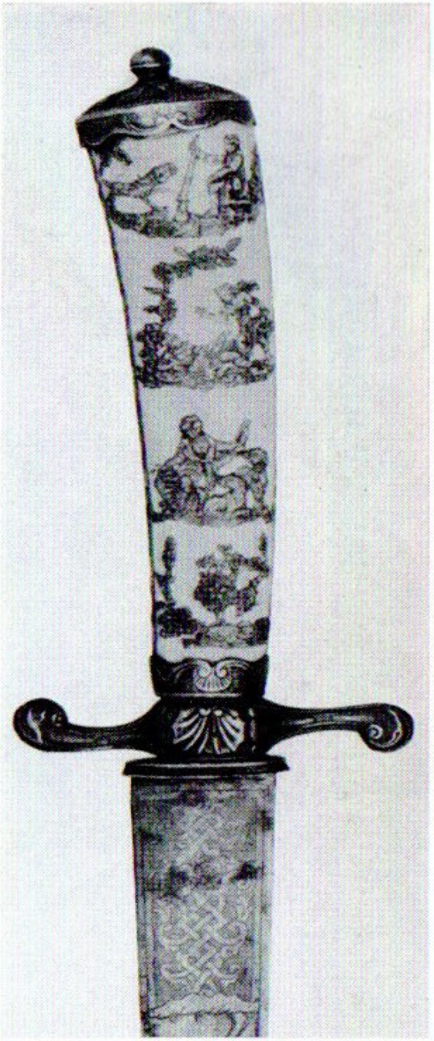
30. Silver-mounted hanger with carved ivory grip. *German, c.* 1720. *Tower of London.*



31. Brass-mounted hanger with carved ivory grip. *German, c.* 1690. *Victoria & Albert Museum.*



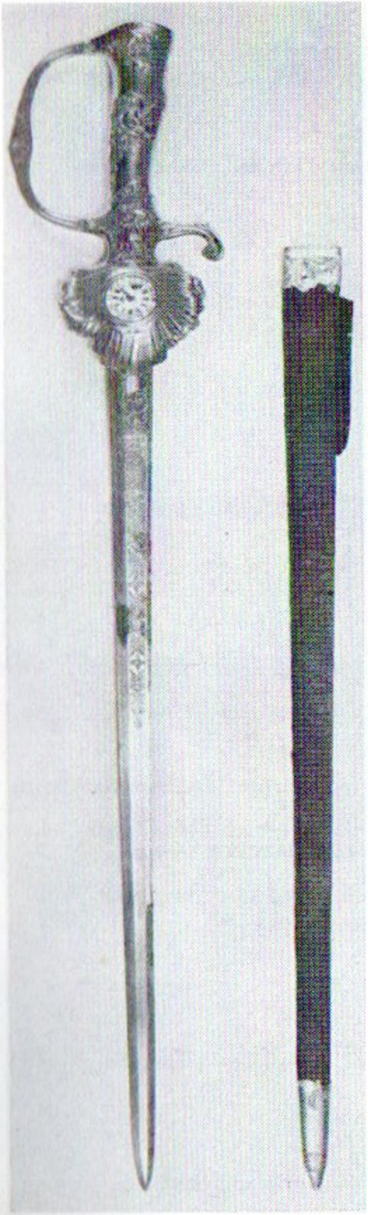
32. Hunting sword with belt, frog, knife and fork *en suite.* The grips and belt plaques of painted enamel on copper. *German, c.* 1760. *Victoria & Albert Museum.*

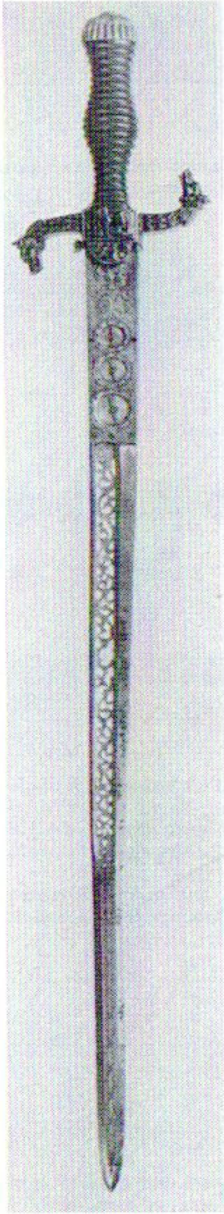


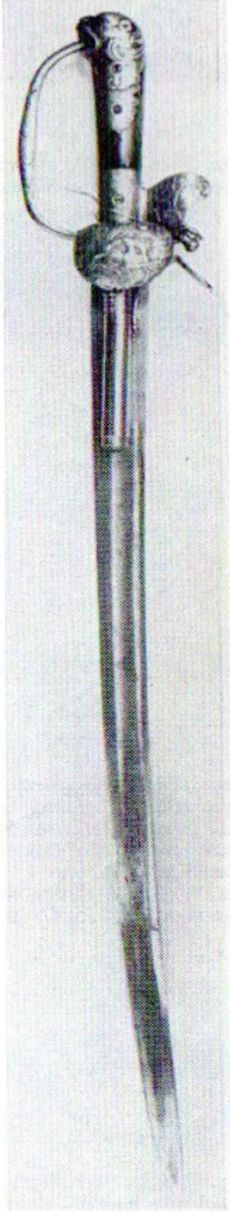
33. Hanger hilt of porcelain painted with hunting scenes. Silver mounts. *French,* hallmarked 1778. *Metropolitan Museum, New York.*

34. Hanger and scabbard. Grooved brown-horn hilt. Pierced and chiselled-steel mounts. *German, c.* 1790. *Metropolitan Museum, New York.*

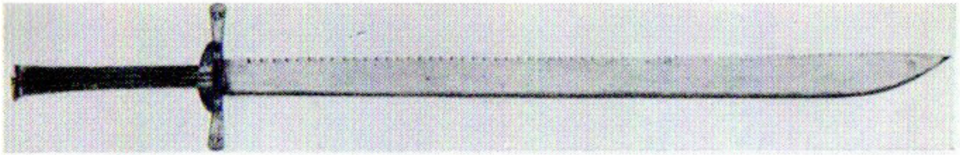
35. Steel hilt chiselled with portrait medallions. Solingen blade signed MONTFORT MD FOURBISSEUR PRÈS LA DAME STE ELISABETE A NANCY. *French, c.* 1780. *Metropolitan Museum, New York.*



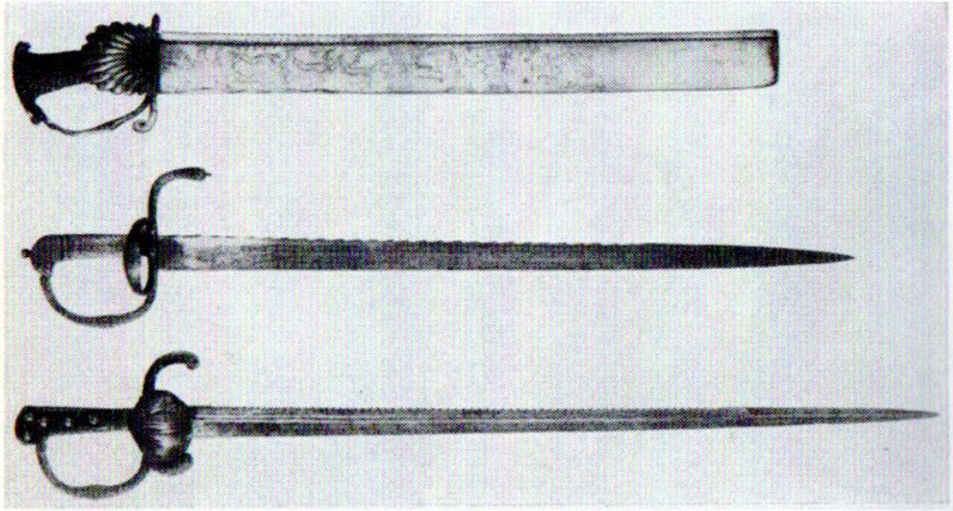




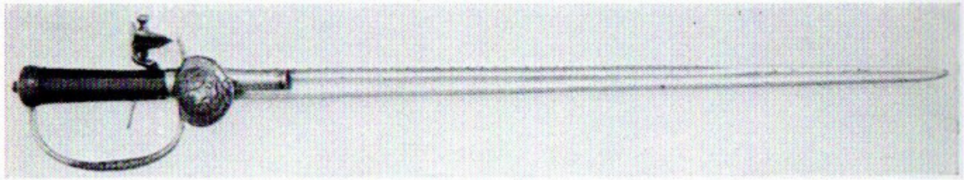
36. (*left*) Hanger with cast brass hilt containing verge watch by BÈNO HUEBER, VIENNA, dated 1619. *Austrian, c.* 1740. *Bayerisches Nationalmuseum, Munich.*
37. (*centre*) Hanger with fretted blade, the ricasso fitted with three counters. *German, c.* 1820. *Art Gallery & Museum, Glasgow.*
38. (*right*) Hanger with flintlock pistol. Brass hilt with up-turned guard for cock. *Austrian, c.* 1780. *Private Collection.*



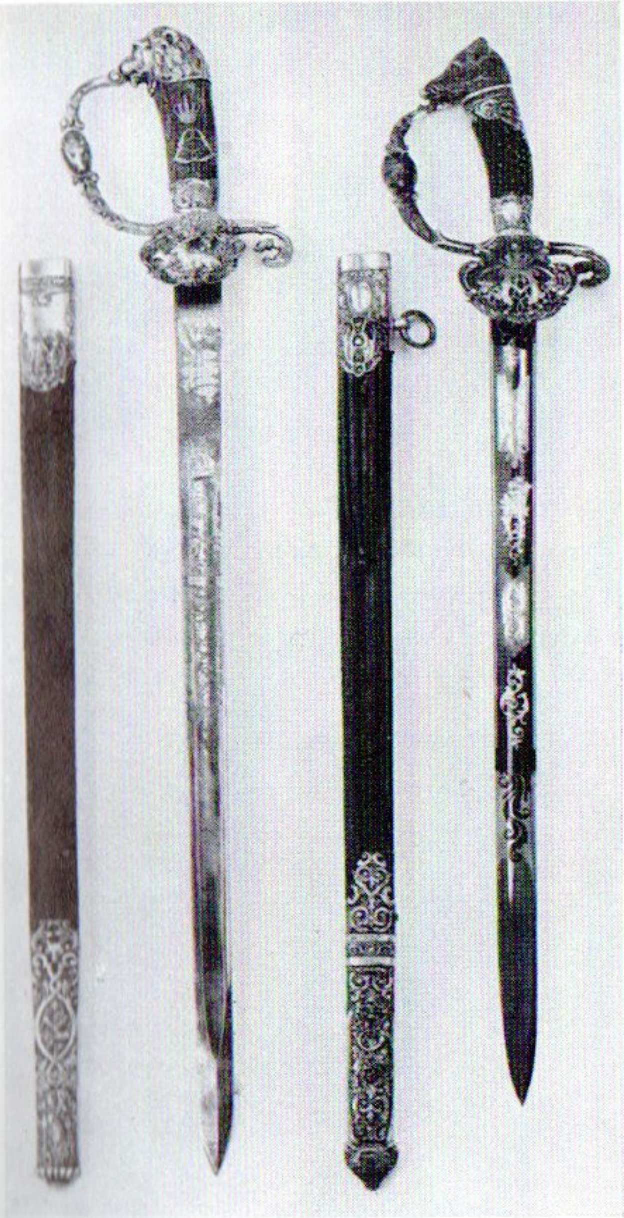
39. Two-handed sword with saw-back blade, chiselled-steel hilt and staghorn grips. *German, c.* 1600. *Tower of London.*

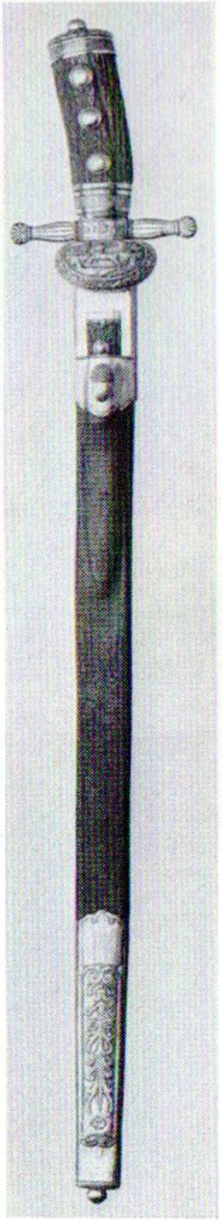


40. (*above*) Chopping sword with saw-back blade engraved with hunting scenes, staghorn grip and shell guard. *German,* dated 1663.
41. (*centre*) Hunting sword with chiselled-steel hilt, the saw-back blade bearing the mark of CLEMENS HORN and the inscription CONSTANTES FORTUNA JUVAT. *German,* dated 1630.
42. (*below*) Hunting sword, the guard of engraved and gilded iron; saw-back blade. *German, c.* 1640. *Deutsches Jagdmuseum, Munich.*

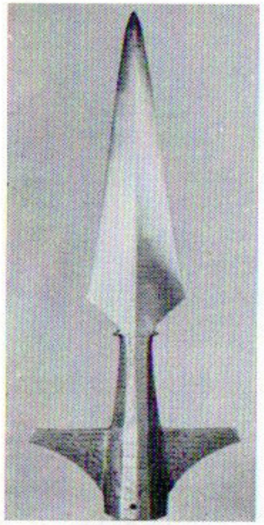
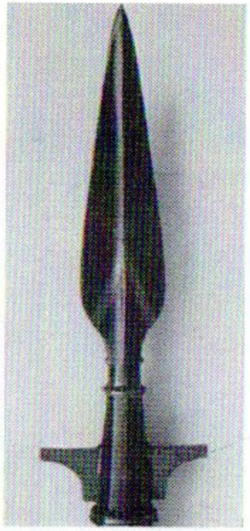
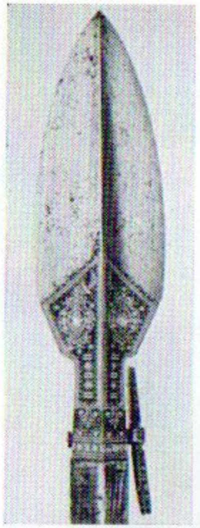


43. Hanger with flintlock pistol and saw-back blade, ebony grip and chiselled-steel hilt. *English, c.* 1750. *Tower of London.*

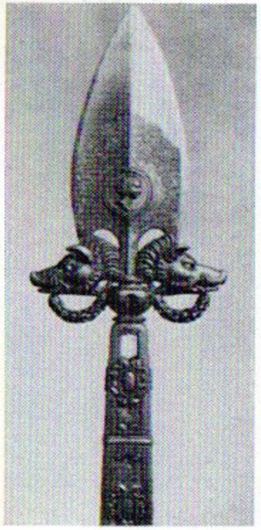
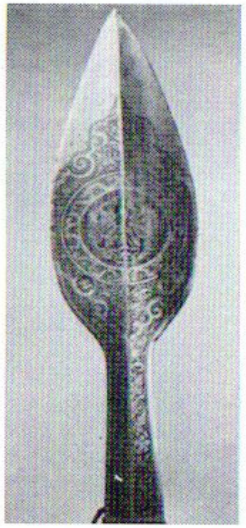




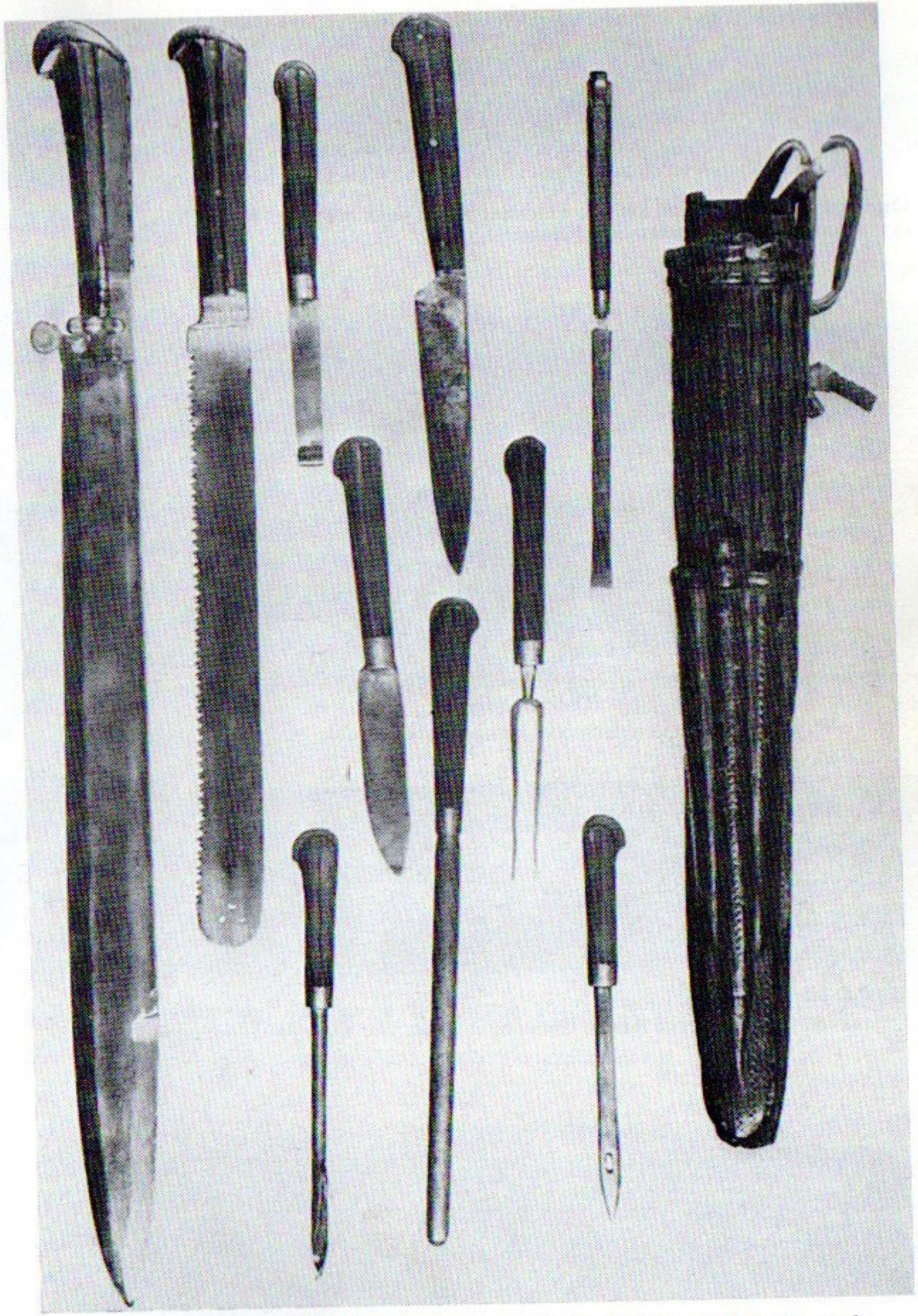
44. (*left*) Hunting sword. Silvered grip bearing the initials of Ludwig II of Bavaria. Signed JOHANN STROBLBERGER CARLSTHOR MUNICH. *German, c.* 1860. *Deutsches Jagdmuseum, Munich.*
45. (*centre*) Hunting sword of Prince Adalbert of Bavaria by same maker. *German, c.* 1850. *Deutsches Jagdmuseum, Munich.*
46. (*right*) Hunting sword of Frederick VI of Denmark. Brass mounts, staghorn grip. *Danish, c.* 1830. *Rosenborg, Copenhagen.*

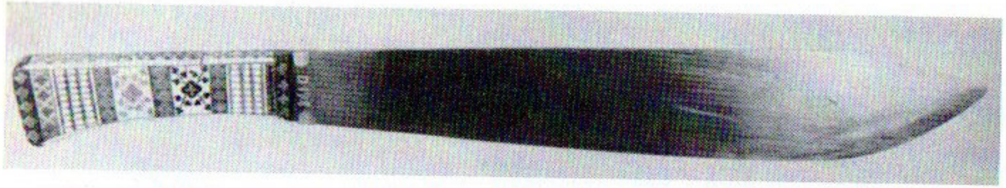
47. (*left*) Spear head of Emperor Frederick III of Austria, *c.* 1435. *Kunsthistorisches Museum, Vienna.*
48. (*centre*) Winged spear with brass inlay. *English, c.* 1450. *Metropolitan Museum, New York.*
49. (*right*) Hunting spear. Etched blade inlaid with silver and gold. *French, c.* 1610. *Tower of London.*

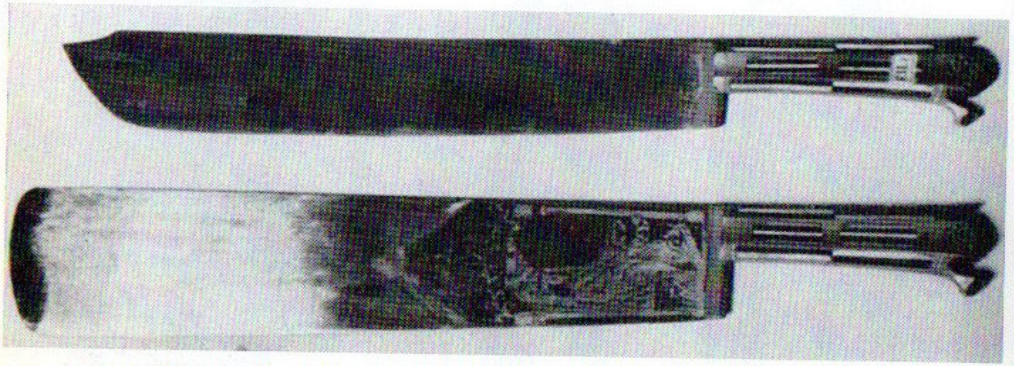
50. (*left*) Chiselled and damascened boar spear of Archduke Ferdinand II. *Milanese, c.* 1559–60. *Kunsthistorisches Museum, Vienna.*
51. (*centre*) Hunting spear with etched decoration. *S. German, c.* 1550. *Victoria & Albert Museum.*
52. (*right*) Boar spear blade, pierced twice for toggle and retainer, engraved with badge and motto of Charles V of Austria. *S. German, c.* 1550. *Tower of London.*



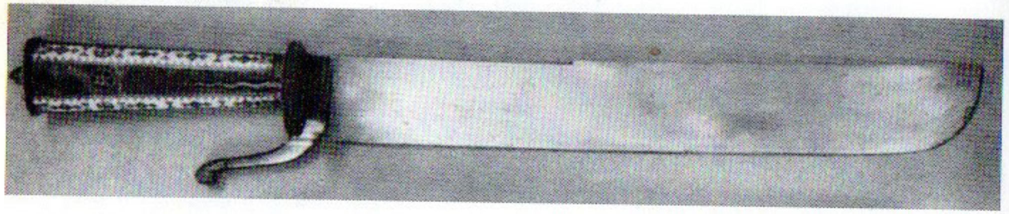
53. Hunting trousse. Knife with cutlery, saw, chisels, bodkin, gimlet, etc., and scabbard. *German, c.* 1580. *Odescalchi Collection, Rome.*



54. One of a pair of hunting knives. Handles inlaid with coloured ivory. *Swiss, c.* 1355. *Kunsthistorisches Museum, Vienna.*



55. Knife and presentoir from hunting trousse of Maximilian I by Hans Sumersperger, Hall in Tyrol, 1496. *Stift Kremsmünster.*



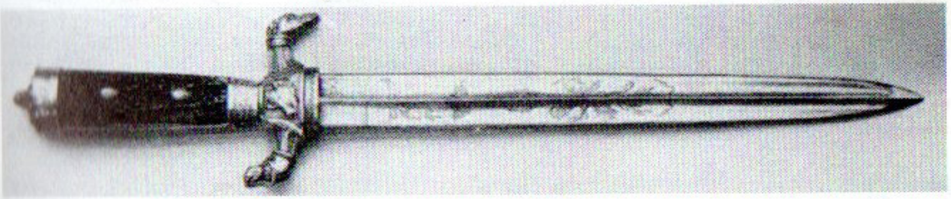
56. Chopper from hunting trousse. Grip inlaid with ivory and tortoiseshell. Guard engraved with Imperial Arms. *German, c.* 1620. *Art Gallery & Museum, Glasgow.*

57. Chopper from hunting trousse. Handle of gilt bronze in the form of a stag. Blade etched with arms of Brandenburg. *German,* dated 1732. *Wallace Collection, London.*

58. Hunting knife. Horn handle inlaid with silver. *Neapolitan, c.* 1730. *Victoria & Albert Museum.*

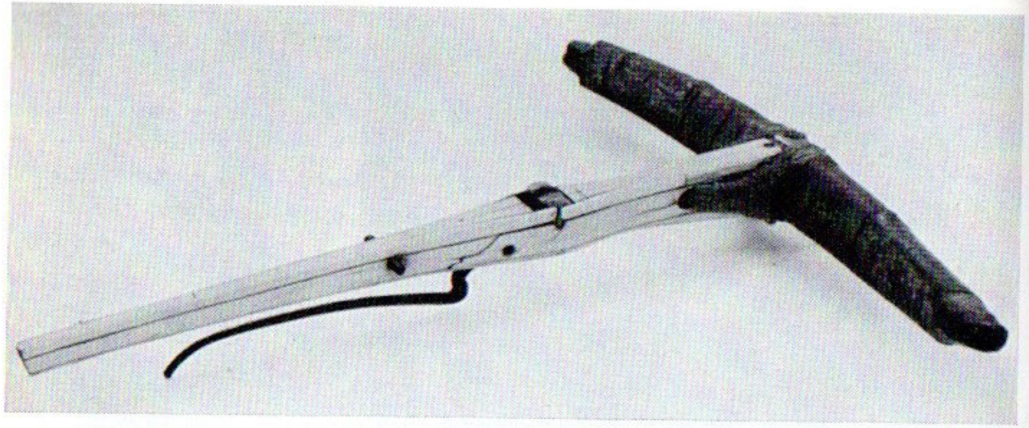
59. Hunting knife with bodkin tang. *Italian, c.* 1750. *Private collection.*

60. Hunting knife with silver mounts. *Italian, c.* 1760. *Private collection.*

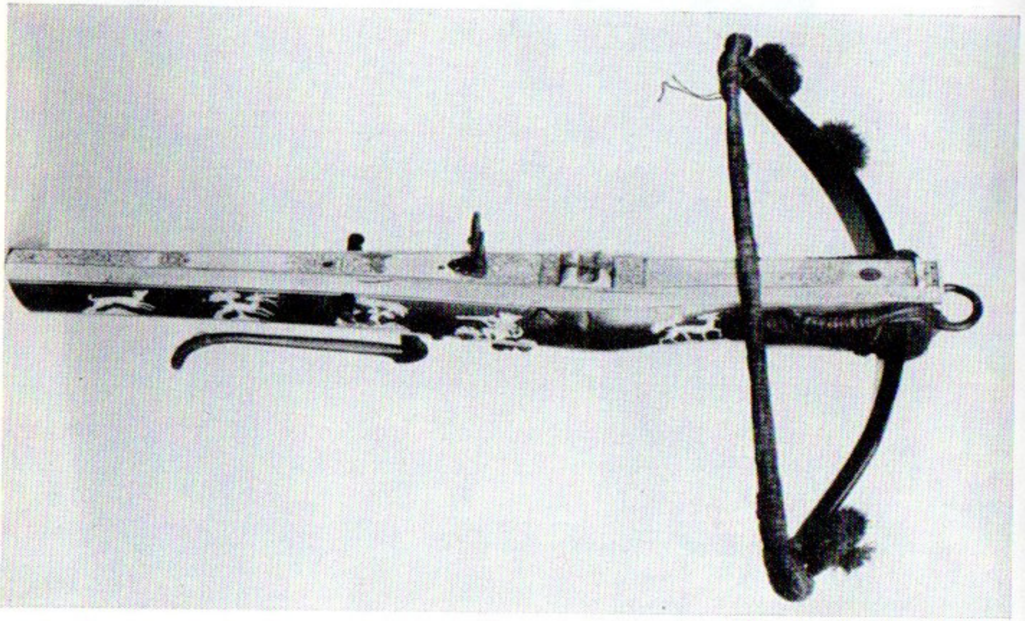


61. Silver-hilted hunting dirk. *French, c.* 1800. *Private collection.*

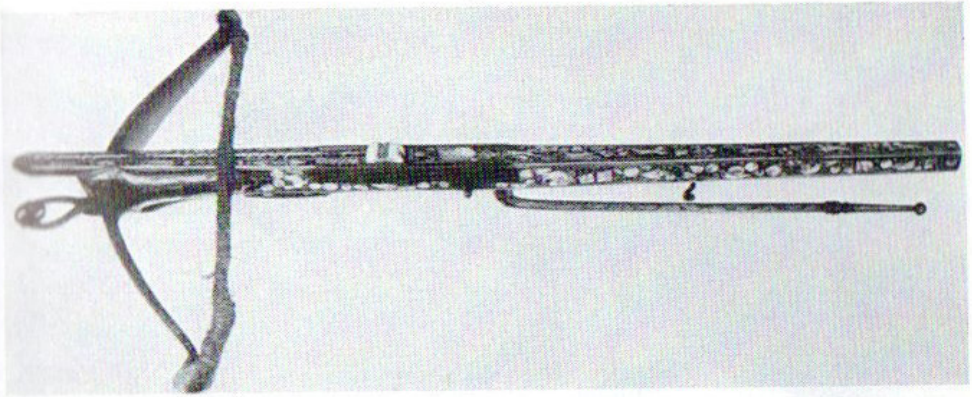
62. Double-edged hunting knife. *German* (?), *c.* 1840. *Tower of London.*



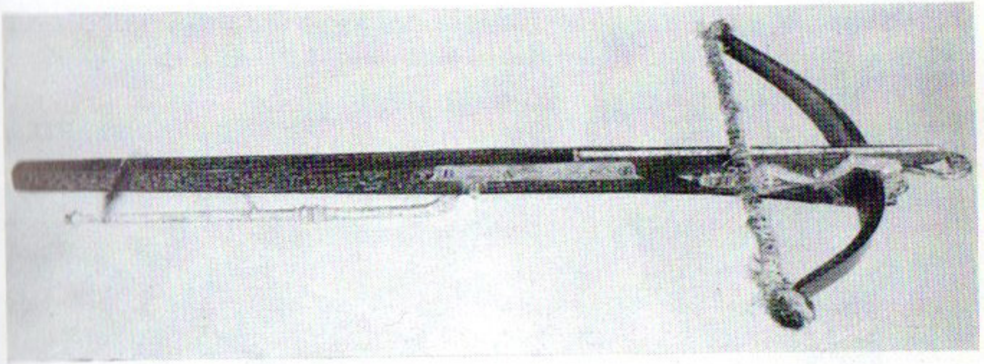
70. Crossbow. Stock covered with ivory plaques. Composite bow. *German, c.* 1500. *Tower of London.*



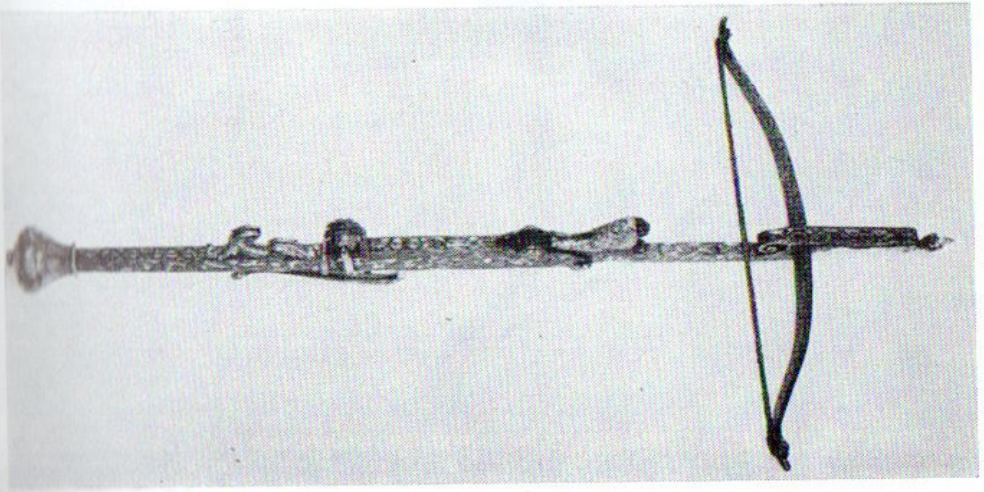
71. Crossbow. Ebony stock inlaid with staghorn. Steel bow. *Saxon,* dated 1629. *Victoria & Albert Museum.*



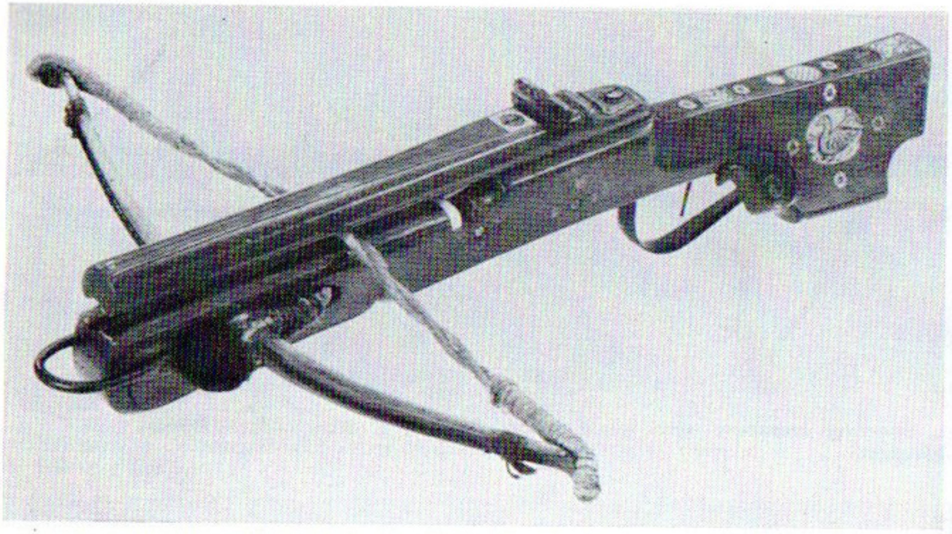
72. Sporting crossbow with inlaid stock. *English, c.* 1620. *Mark Dineley Collection.*



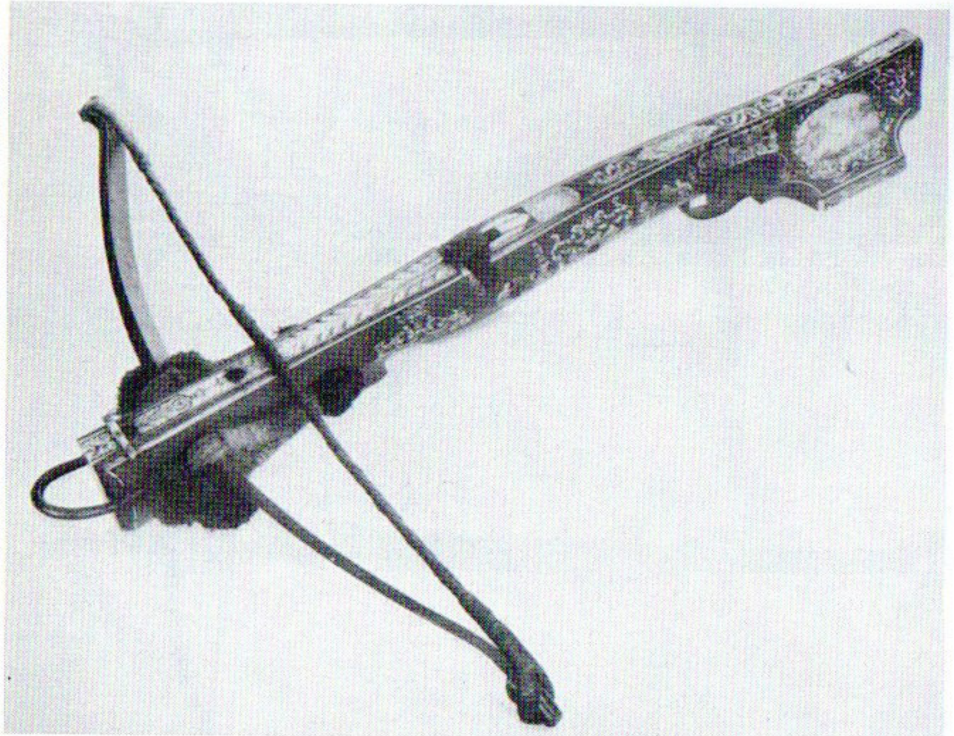
73. Crossbow enriched with gold. Part of a gift from James I of England to Philip III of Spain. *English, c.* 1604. *Real Armeria, Madrid.*



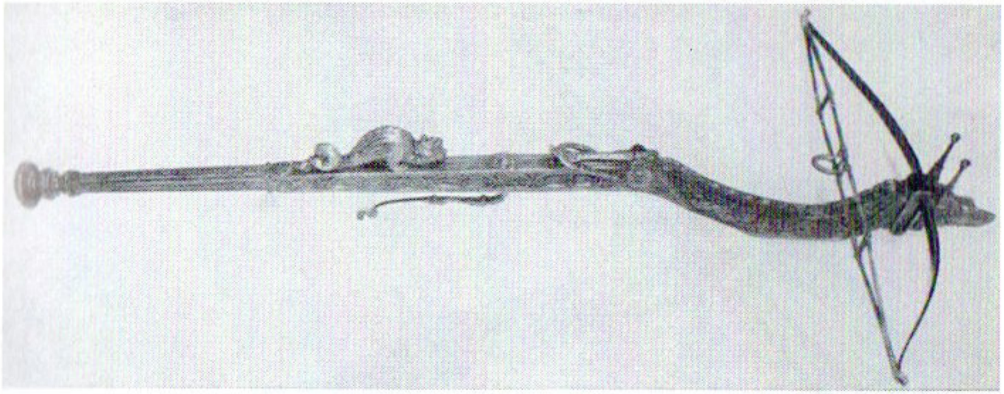
74. All-steel crossbow, chiselled and gilt. *French, c.* 1660. *Wallace Collection, London.*



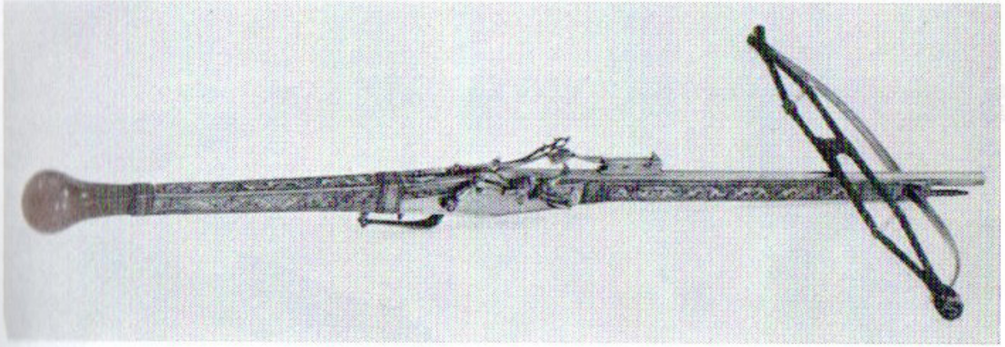
75. Barrel crossbow with inlaid stock and cheek butt. *German*, c. 1720. *Tower of London.*



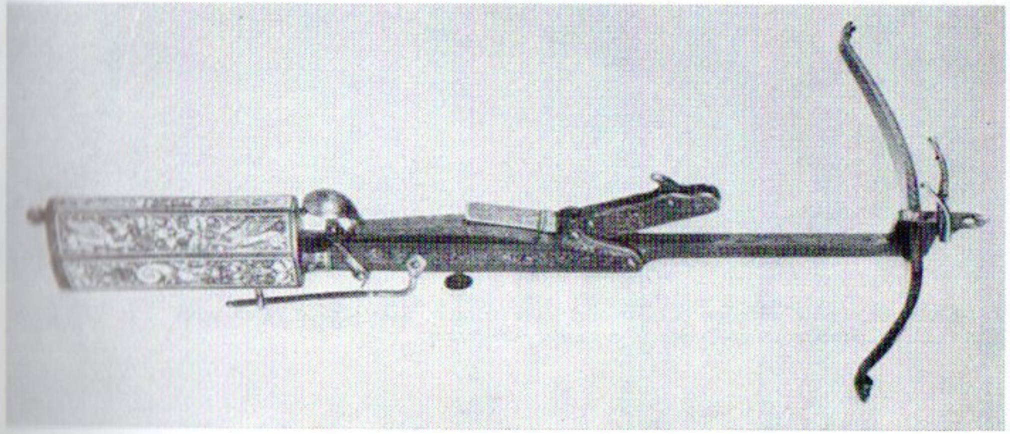
76. Crossbow with inlaid pearwood stock and cheek butt. *German*, c. 1720. *Private collection.*



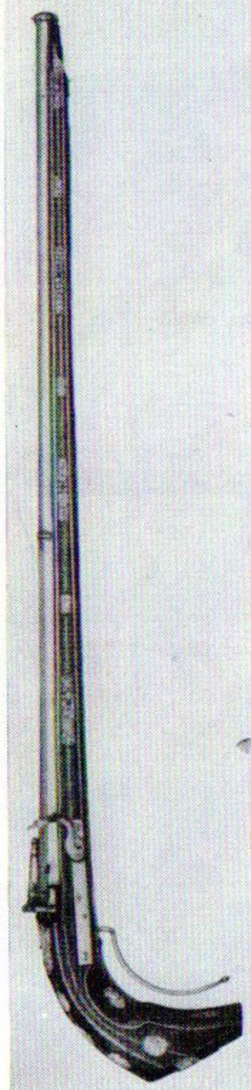
77. Stone crossbow. Carved yew stock. *Italian*, c. 1580. *Wallace Collection, London.*

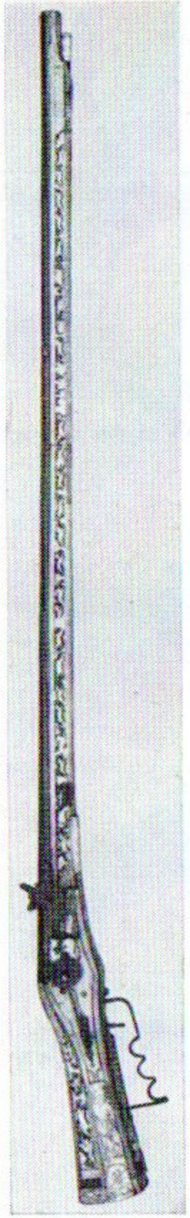


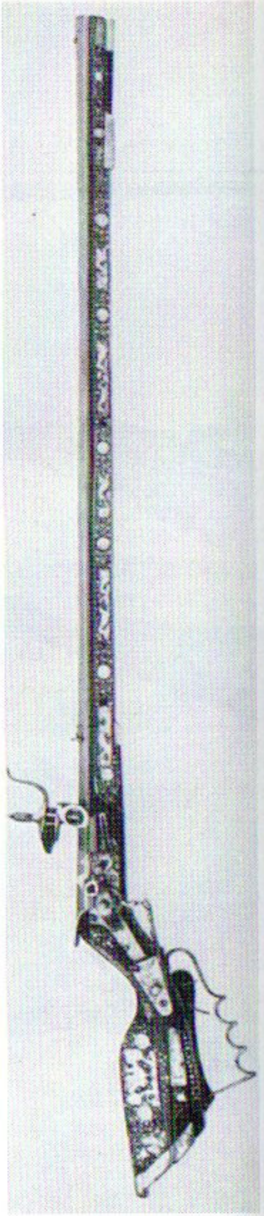
78. Stone crossbow with snaphance gun. *N. Italian*, c. 1630. *Tower of London.*



79. Stone crossbow with hinged bender. Steel frame and bow damascened in gold and silver. Club butt inlaid with horn and mother-of-pearl. *Milanese*, c. 1600. *Victoria & Albert Museum, London.*

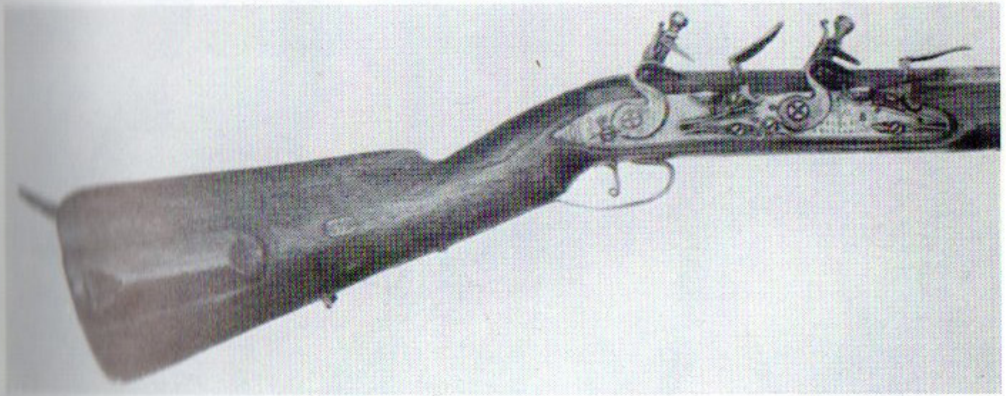






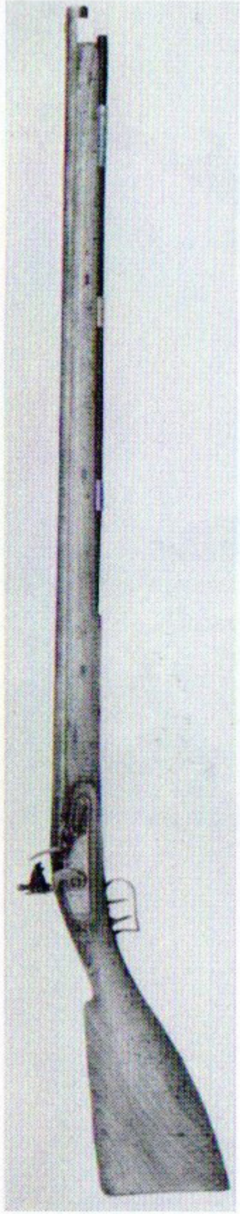
85. (*far left*) Matchlock gun with tubular backsight. Stock inlaid with engraved staghorn. *French, c.* 1595. *Tower of London.*
86. (*left*) Matchlock rest rifle. Stock inlaid with mother-of-pearl sporting scenes. *Swiss,* dated 1619. *Tower of London.*
87. (*centre*) Wheellock gun. Stock inlaid with sporting scenes. Lock and barrel with Nuremberg marks. *German, c.* 1580. *Tower of London.*
88. (*right*) Wheellock rifle or *tschinke*. Hair trigger. *Silesian, c.* 1620. *Tower of London.*

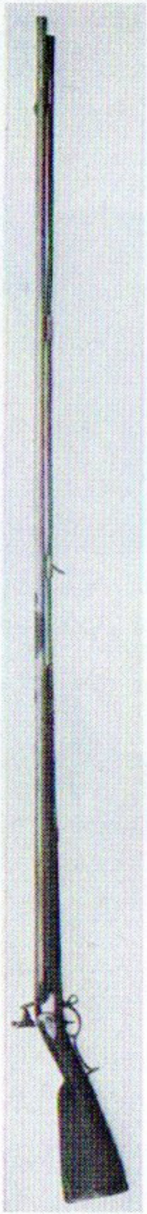
89. Self-spanning wheellock in the shape of a stag by JACOB ZIMMERMAN. *German,* dated 1646. *Museum für Deutsche Geschichte, Berlin.*



90. Superimposed-charge chamois rifle signed PISSARD A SALLANCE. *Swiss, c.* 1780. *Musée d'Art et d'Histoire, Geneva.*

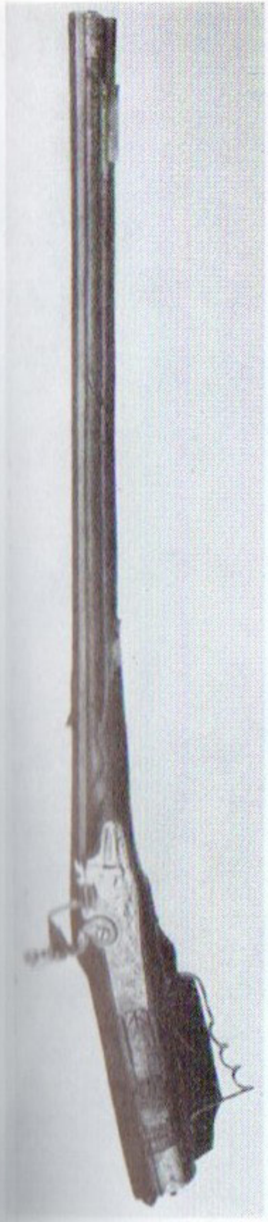
91. All-steel flintlock gun, chiselled and engraved overall. Signed STEFANO ZOLI, F. IN BRESCIA. *Italian, c.* 1680. *Tower of London.*

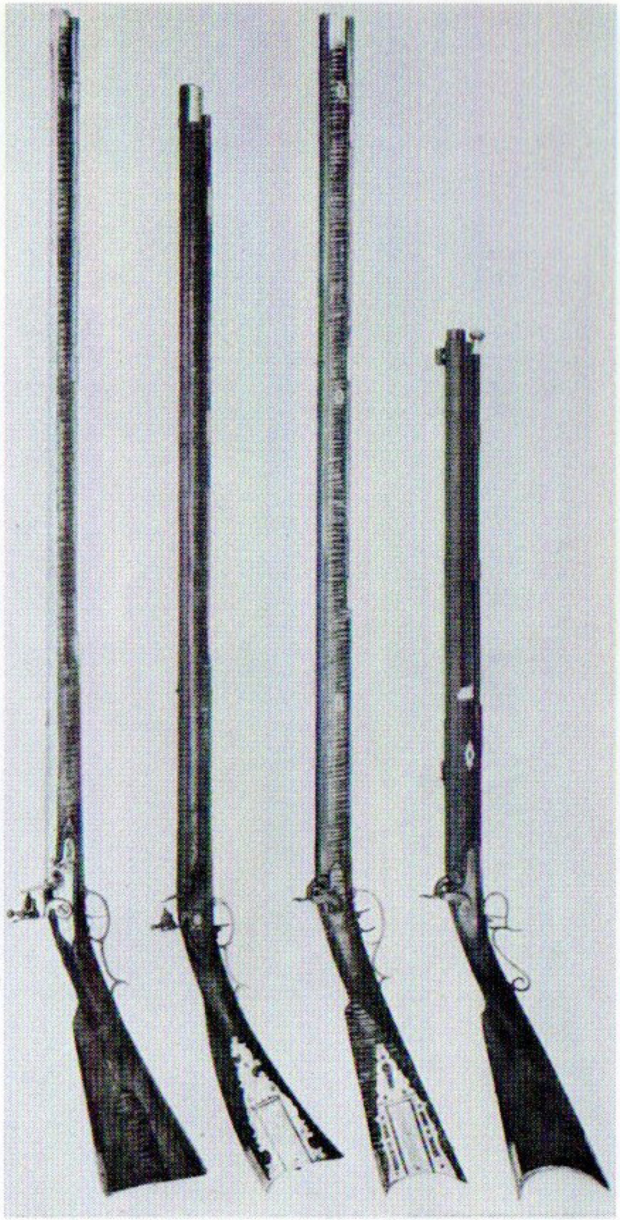




Left to right

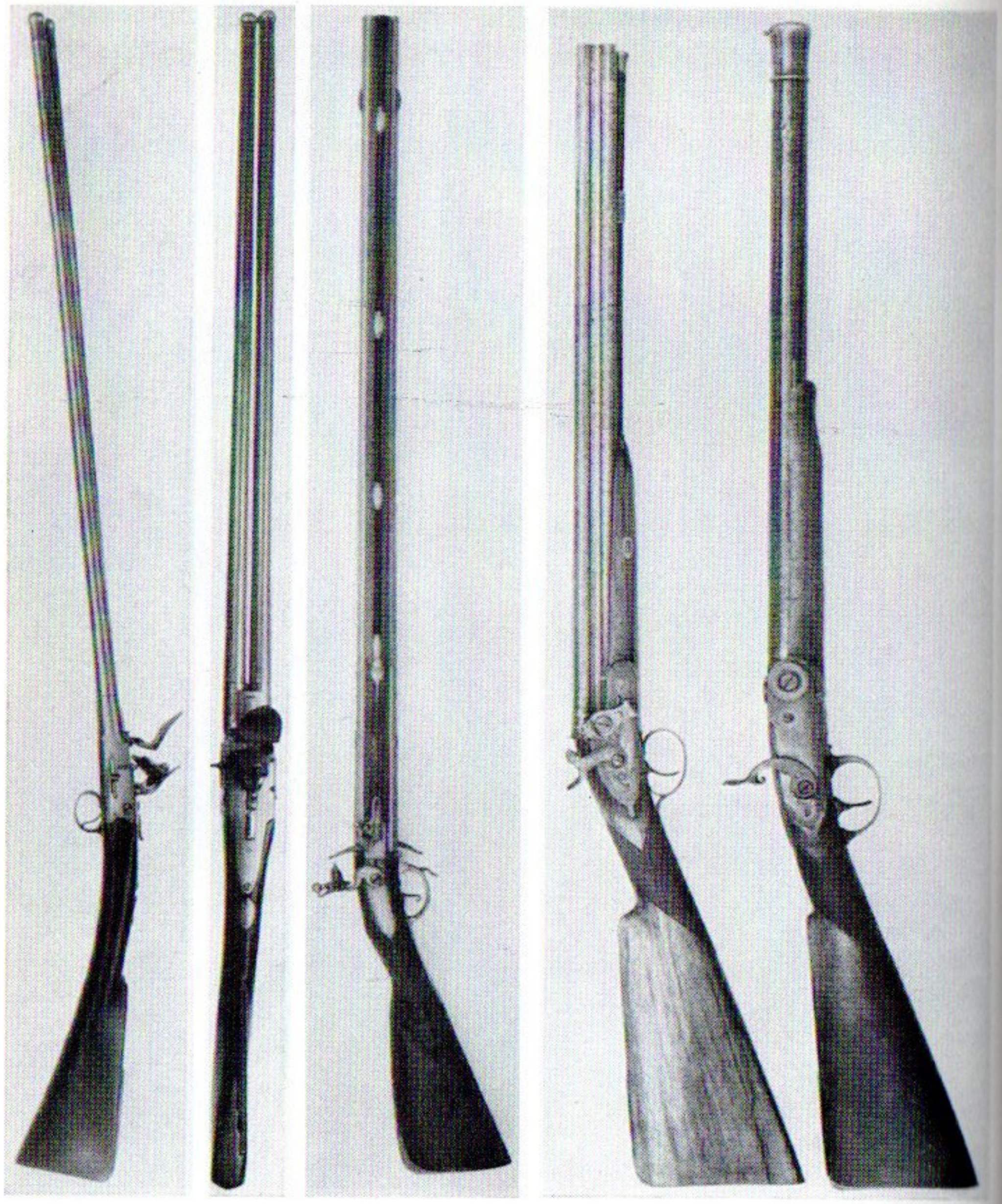
92. Cape rifle, straight grooved, by JONES. *English c.* 1820.
93. Flintlock fowling piece. 76 in. barrel. *Flemish* (?) *c.* 1760. *Tower of London.*
94. Small-bore flintlock rifle. Full stock carved and painted to resemble tortoiseshell. *French, c.* 1640.
95. Silver-mounted flintlock gun. Half-stocked. *Italian, c.* 1700.
96. Flintlock gun by IVAN PUSHKIN. Stock inlaid with gilt plaques and silver wire. *Russian, c.* 1790.
97. Rifled carbine, blued and gilt barrel signed I. E. KLETTA ZELA S. BLASII. *German, c.* 1780. *A. R. Dufty Collection.*





Left to right

98. Flintlock rifle with wheellock-type stock signed NEIREITER, PRAGUE. *Czechoslovakian, c.* 1710.
99. Flintlock rifle, maple wood stock. *American, c.* 1750.
100. Flintlock rifle. Lock marked LONDON WARRANTED. Barrel length 43 in. *American, c.* 1800.
101. Percussion rifle signed H. LEMAN LANCASTER PA. *American, c.* 1850.
102. Percussion rifle signed P. SOPER 426 LONDON [Canada West]. *Canadian, c.* 1860. *Tower of London.*



Left to right

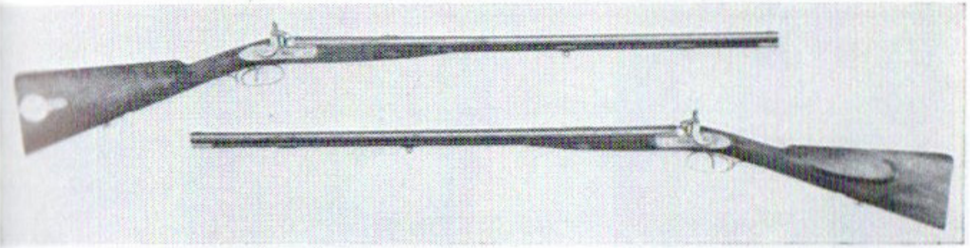
103–104. Side and top view of double-barrelled flintlock shotgun. *English* (?), *c.* 1750. *Art Gallery & Museum, Glasgow.*
105. Flintlock gun signed THIERMAY with over-and-under turn-over barrels. *French, c.* 1710. *Tower of London.*
106. Five-barrelled gun with patent lock signed FORSYTH & CO. Serial no. 3275. *English, c.* 1825.
107. Seven-barrelled cartridge gun by PAULY, LONDON. *English, c.* 1815. *Tower of London.*

Howdah pistols (*top to bottom*)

108. Flintlock pistol by BLISSETT, LONDON. Cal. .550 in. *English, c.* 1810.
109. Percussion pistol by J. PURDEY. Cal. .700 in. *English, c.* 1840.
110. Centre-fire pistol by WILLIAM MOORE & GREY. Rifled for .577 Boxer cartridge. *English, c.* 1870.
111. Pin-fire pistol by J. HARKOM EDINBURGH. Cal. .563 in. *Scottish, c.* 1860. *Tower of London.*

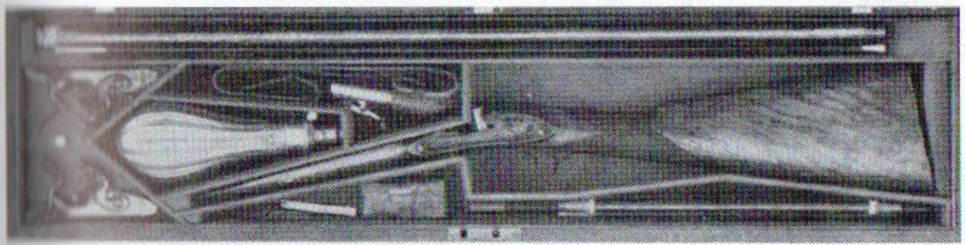
Double-barrelled guns (*left to right*)

112. Robert action shotgun by HANQUETAINE & CIE A LIEGE. *Belgian, c.* 1840.
113. Lefaucheux action shotgun for centre-fire or pin-fire. *Belgian, c.* 1865.
114. Montigny action shotgun. Needle-fire. *Belgian, c.* 1850.
115. Needham patent needle-fire shotgun by JOSEPH NEEDHAM & CO. *English, c.* 1860.
116. Rifle by STANLEY HIGHAM, WARRINGTON. Cal. .500 in. centre-fire. *English, c.* 1880. *Tower of London.*

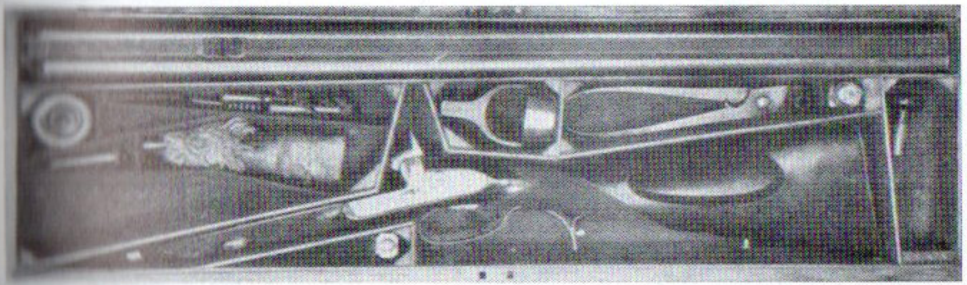


117. Pair of double-barrelled percussion rifles by CHARLES LANCASTER given by Queen Victoria to Prince Albert 26 August 1853. *Collection of H.M. The Queen.*

118. Close-up of butt trap of one of the Lancaster rifles. Silver dots represent kills for each year. The Prince died in 1861.



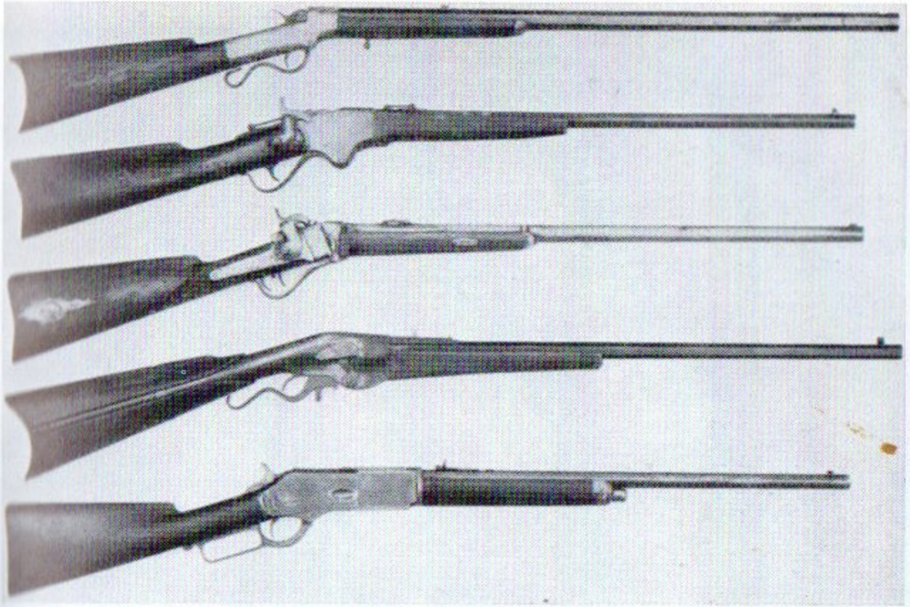
119. Flintlock 20-bore double-barrelled gun in case by JOSEPH MANTON. *English, c.* 1810. *Tower of London.*



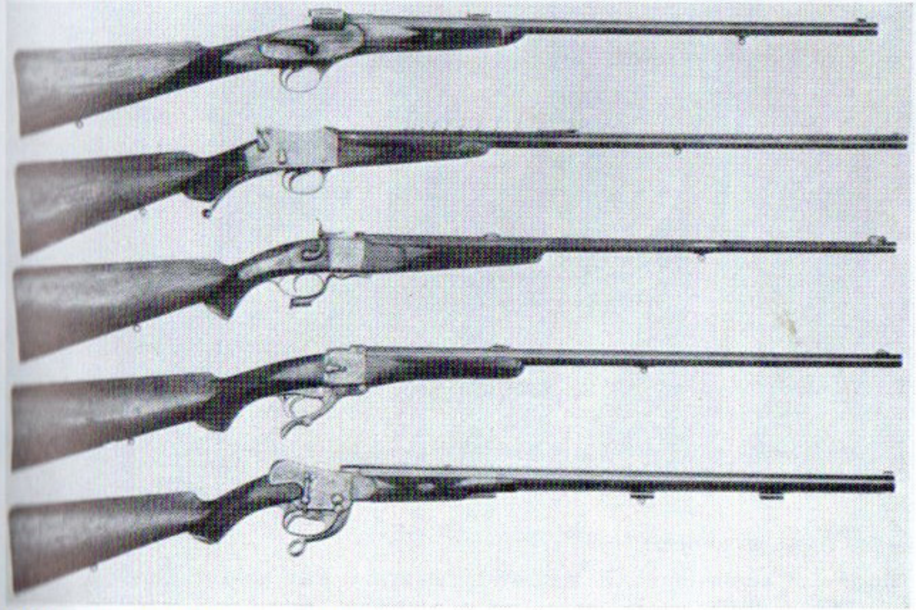
120. Double-barrelled percussion gun in case by Charles Lancaster. One barrel rifled, one smooth. *English, c.* 1850. *Private collection.*

Big bores (*left to right*)

121. 8-bore flintlock elephant gun by PROSSER, LONDON. 28 in. barrel. Wt. 13 lb. *English, c.* 1820.
122. 1½ in. bore percussion swivel gun by PETHER, OXFORD. 32 in. barrel (possible shortened). Wt. 15 lb. *English, c.* 1830.
123. 5-bore 'Reid's Double Ribbed Rifle' by ALEXANDER THOMSON & SON, EDINBURGH. Wt. 15 lb. *Scottish, c.* 1850.
124. 6-bore double-rifle by HOLLAND & HOLLAND. 24 in. barrels. Fixed sight for 50 yards. Wt. 22 lb. *English, c.* 1900. *Tower of London.*



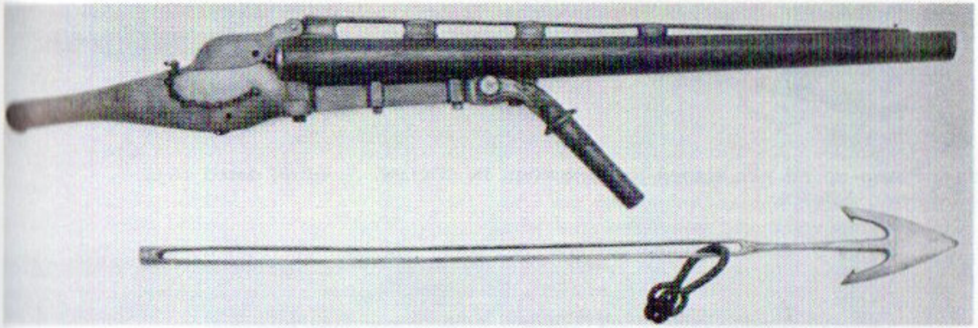
American sporting rifles (*top to bottom*)
125. Ballard single-action .38 cal. rim-fire by BROWN MANUFACTURING CO. *c.* 1865.
126. Spencer seven-shot .44 cal. rim-fire, *c.* 1867.
127. Sharps Model 1853 De Luxe. .55 cal. Pellet primer; paper or linen cartridge.
128. Evans Model 1877 repeater (26 shots). .44 cal. rim-fire.
129. Winchester Model 1876. Cal. .50/95 Express. *Tower of London.*



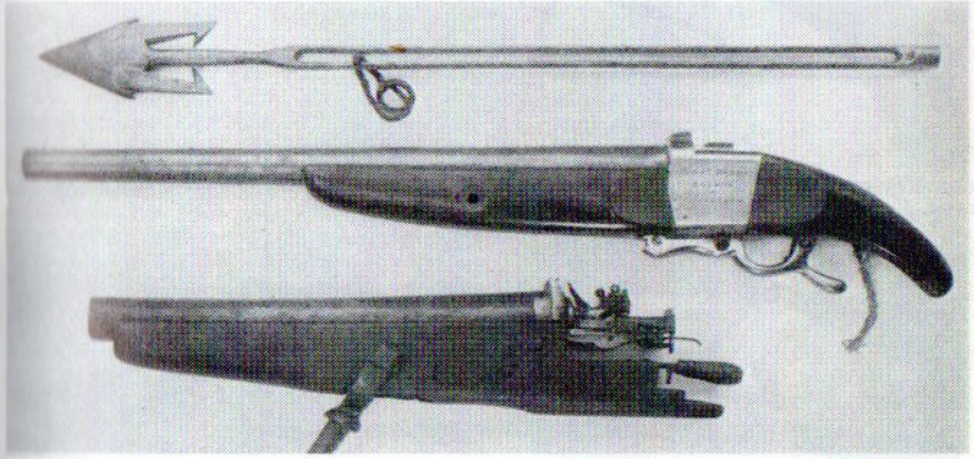
British sporting rifles (*top to bottom*)
130. Hinged-block action by WILLIAM SOPER, READING, patented 1868. .577/450 cal.
131. Martini action by ISAAC HOLLIS & SONS, patented 1868. .577/450 cal.
132. Alexander Henry dropping-block action, patented 1865. .450 cal.
133. Farquharson dropping-block action, patented 1872; GIBBS .400 Express
134. Westley Richards action by JAMES WOODWARD, LONDON, patented 1868. Henry's rifling for .500 Express. *Tower of London.*

Bolt-action rifles (*left to right*)

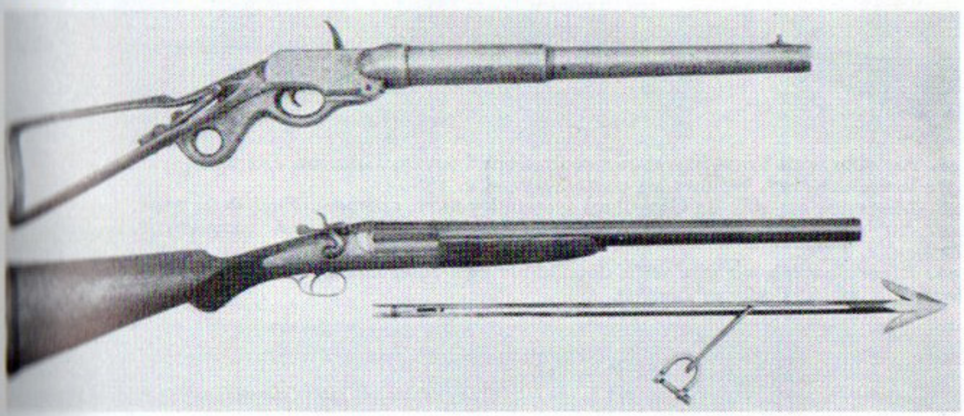
135. Single-shot needle-fire by F. V. DREYSE, SOMMERDA. Part horn trigger-guard. *German*, *c.* 1850.
136. Combination of magazine rifle and side-lock, break-action shotgun with bayonet stub by P. OBERHAMMER, MUNCHEN. *German*, *c.* 1900.
137. Mannlicher Schoenauer Model 1903 fully-stocked carbine, rotary magazine. Cal. 6·5 mm. *Austrian* (*Steyr*), *c.* 1905.
138. Mauser action, barrelled by JOHN RIGBY to .303 service cartridge and stocked for one-armed man. *English*, 1918. *Tower of London*.



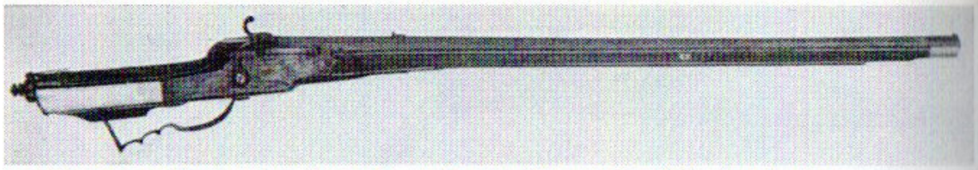
139. Harpoon swivel gun by WILLIAM GREENER, BIRMINGHAM. 36 in. barrel with two percussion nipples, 1¼ in. bore. *English*, dated 1852. *Tower of London*.



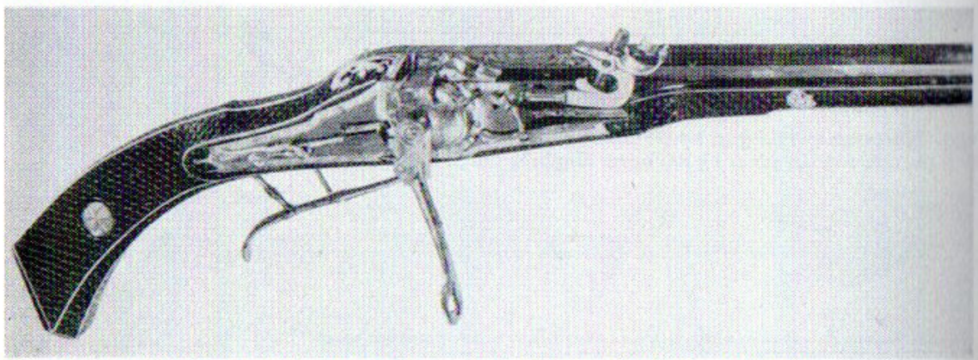
140. (*top*) Harpoon swivel gun by ALEX. HENRY, LONDON & EDINBURGH. 36 in. barrel, 1½ in. bore. *English*, *c.* 1870.
141. (*bottom*) Harpoon swivel gun. Double flintlocks (cover missing). 25 in. barrel, 1½ in. bore. *English*, *c.* 1800. *Private collection*.



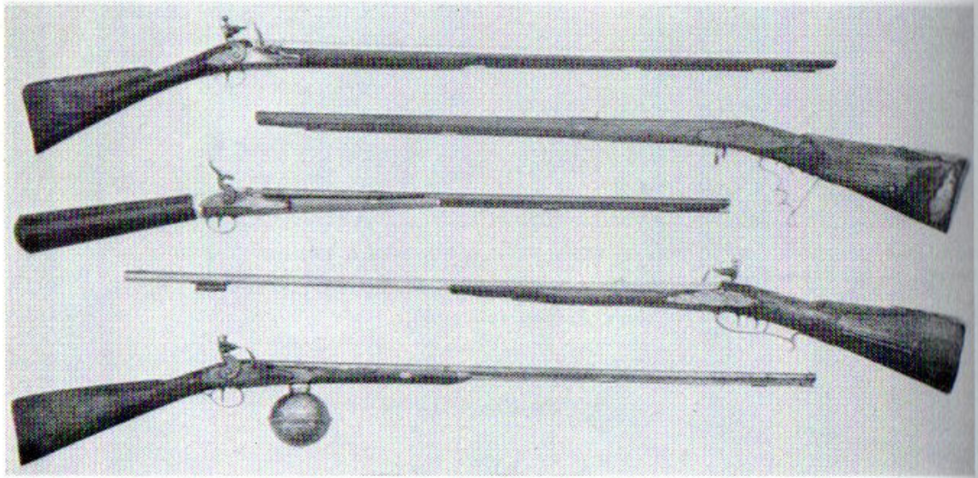
142. (*top*) All-bronze harpoon gun by S. EGGERS, NEW BEDFORD, MASS. 4-bore centre-fire. *American*, *c.* 1880.
143. (*bottom*) Harpoon gun by THOMAS BLAND & SONS, LONDON. 21 in. barrel of 16 bore. *English*, 1914. *Tower of London*.



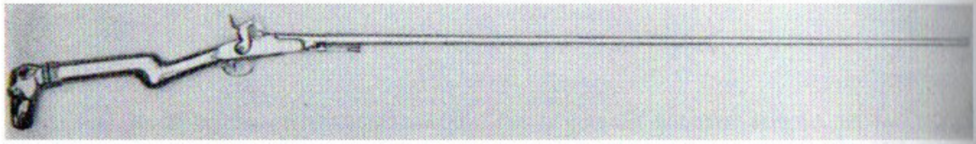
144. Pump-up air gun signed JOHANN KOCK IN CÖLLEN. *Swedish*, dated 1654. *Skokloster, Sweden.*



145. Key-operated piston air-gun made to look like a wheellock. *German, c.* 1575. *Kunsthistorisches Museum, Vienna.*



146. Air rifle with brass barrel-reservoir signed JOVER, LONDON. *c.* 1780.
147. Breechloading, bellows air-gun. *German, c.* 1780.
148. Magazine air-rifle on Girardoni system by BATE, LONDON. *English, c.* 1795.
149. Air rifle with pump-up butt-reservoir signed BOSLER A DARMSTADT. *German, c.* 1750.
150. Breechloading air gun with detachable ball-reservoir by BALES, IPSWICH. *English, c.* 1820. *Tower of London.*



151. All-brass air gun with elk's head butt-reservoir. *Austrian, c.* 1850. *Metropolitan Museum New York.*

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